ILLINOIS MEDICAL JOURNAL

THE OFFICIAL ORGAN OF
THE ILLINOIS STATE MEDICAL SOCIETY

ENTERED IN THE SPRINGFIELD POSTOFFICE AS SECOND-CLASS MATTER.

VOL. XIV SPRINGFIELD, ILL., OCTOBER, 1908 No. 4

ORIGINAL ARTICLES

THE SIGNIFICANCE OF INFLAMMATION AND ITS TREATMENT.*

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After reading a great deal of the modern literature treating the subject of inflammation, I am convinced that some phases of the object of this phenomenon are still not clearly understood. The old idea that existed during the days of Celsus and Galen and on down through the ages prevailed until the last few decades. Even when Cohnheim, who was the first to study inflammation in the living animal under the microscope, shed the first real light by demonstrating the emigration of leucocytes and exudation and diapedesis its insignificance was not thought of. The modern conception of inflammation, that is, that it protects, defends and regenerates the effects of injury, is the result of the researches of a great many of the most eminent investigators for several centuries. I learn from the literature on this subject that Metschnikoff was the first to teach that inflammation was a protective and defensive process. But he limited his teaching to phagocytosis and attributed the entire phenomenon of inflammation to that, which theory his critics have clearly demonstrated and proved to be erroneous. Phagocytosis is only one of the important elements that enter into the makeup of this process. The modern conception of the complete phenomenon called inflammation is a matter of current literature, consequently that will not be discussed here. Any one who does not understand the subject—and every one should know what is known about it to-day—can easily inform himself by reading the writings of such men as Durck, Stengel, Hekteon and a number of other authorities and see clearly what is almost universally accepted by all to-day. One of the best papers I have read on

* Read at the Fifty-eighth Annual Session of the Illinois State Medical Association, May 19-21, 1908.

this subject was written by Dr. Ludvig Hekteon, of Chicago, about ten years ago, entitled "Old and Modern Theories of Inflammation; Its Nature and Purpose," in which he said and thinks to-day: "The common origin, the similarity of the changes, though combined in differing proportions, and the recognizable tendency in these changes to protect and repair, justify fully the teaching that the inflammatory processes are essentially adaptive, protective and reparative." Then, at the close of the paper, he says: "It is an adaptive and self-preservative, and yet often harmful and wayward process, that requires the intervention of man. Consequently inflammation from the clinical standpoint is harmful; but from the pathologic or biologic, a struggle for self-preservation. Inflammation is the reaction of the tissues to local injuries, calling forth protective and reparative measures; an imperfect pathologic adaptation often leading to consequences that are dangerous *per se* and may defeat its purpose." As examples he cites "occlusion of the larynx in consequence of violent inflammatory reaction to fatal cerebral compression from excessive serous exudation in inflammation of the meninges," but he does not explain what would become of these cases if this reaction didn't take place. These cases have a better chance with the reaction than without it, because then they have a chance of getting surgical assistance which is often successful, while without the reaction, in my opinion, they would have no show at all. I have read several articles stating that reaction sometimes does not take place at all in fatal infections and pyemia cited as an instance. As long as the infection is in the circulatory media no reaction, so far as I know, takes place further than a destruction of the cellular elements of the blood or lymph, but as soon as the fixed tissue cells are attacked reaction always takes place if the phagocytic elements are strong enough to make the defense. In other words, if an army runs out of ammunition the fight is ended and the enemy wins the day. Whenever inflammation is "wayward and harmful," whenever it is "an imperfect pathologic adaptation and leads to consequences dangerous *per se* and defeats its own object," there is always a good reason for it whether that reason is understood or not.

The cause of the inflammation may be so overwhelmingly strong that the strongest possible fighting force could not overcome it. Then again, the opsonic index of the patient may be so low that the mildest and simplest cause can not be withstood. There are all grades and varieties between these two extremes. Inflammation is a law of Nature. The laws of Nature are never mistakes, but their administration and workings on account of the interference with their purpose of many circumstances, make it appear that Nature makes lots of mistakes. You can not go through a cornfield in the State of Illinois (and there are none better) without seeing here and there improperly developed stalks with puny ears. You can not go through the grandest forests of the world without seeing imperfections there. So it is everywhere, but germinologists and those who understand germination and subsequent growth can give a clear explanation of all these defects. So ought we to be able to explain all the shortcomings of inflammation. It is my opinion that each

variety of leucocyte, as well as the erythrocytes and the blood plasma, has a separate and distinct function to perform during this process, but I can not prove it. I can only make the statement from a theoretical standpoint and from logical deductions that to me seem clear. What the function of each element is I can not explain, neither have I been able to find out from the literature I have consulted.

A strong confirmatory evidence of the specialization of the cellular function is the great preponderance of the polymorphonuclear leucocytes in an acute inflammation and a great prevalence of the lymphocytes in the chronic forms. But of this fact I am convinced: that from the time the blood stream becomes accelerated, then slowed, and lymphocytic infiltration begins, when the polymorphonuclear leucocytes and the rest go to the seat of trouble and the exudation forms when complete stasis occurs in the blood vessels and diapodesis incomplete on up to the end of proliferation of fixed tissue cells, that means to the end of cicatrization, the purpose and aim of inflammation is always protective, defensive and reparative, that is it is never pathological, and when it defeats its aim and the patient dies from the inflammation he would die anyway from its cause. If that is true, and I believe it is, why should inflammation ever be fought and treated as a disease *per se* that should be exterminated, as is done by thousands of physicians all over the country to-day. This statement is no exaggeration, because comparatively few physicians comprehend the meaning of this most important phenomenon.

The treatment of inflammation should always be to protect it, encourage it, and assist it in its object when it is at all possible, but never increase it by spreading the infection. Let me explain clearly on this point. A patient has an infected knee-joint. If that joint is exercised, worked, massaged, etc., the inflammation will be increased, but it will be increased by spreading the infection. If there is an inflammation anywhere along the intestinal tract and peristalsis is increased the inflammation gets worse, but it does so by spreading the infection, consequently anything in the way of treatment that will increase inflammation by spreading the infection should be carefully avoided. The old teaching that the first and most important point in the treatment of inflammation is rest, holds good to-day. Some of the old writers of international reputation said many years ago that complete rest would cure most cases without anything else and that the less that was done the better for the patient. The best way to secure proper rest for an inflamed area, no matter where the inflammation is, is to put the patient to bed. This is sometimes hard to do, but if a patient understands that he will get well quicker and better he will usually accept the advice of his physician.

It is more imperative to secure absolute rest in acute inflammations than in the chronic forms, because in the acute defenses the walling off is more delicate and very easily broken down, and whenever they are destroyed a further dissemination of the infection is encouraged. I consider proper rest one of the most essential points in the successful treatment of inflammation. The Bier treatment has excited a great deal

of interest recently. It has been observed that patients with partial stenosis of the aorta, which produces passive congestion of the lungs, never develop tuberculosis. Bier teaches that hyperemia artificially produced increases and encourages the elements that fight the cause of the inflammation. I have had a very limited experience with this form of treatment. I will have more in the future because I believe the principal is right. This treatment has been widely published in detail with directions when and how to use it, consequently I will not discuss it here. I am not convinced that external applications of any kind are beneficial in the treatment of inflammation. All kinds of mixtures are still used to-day, from the mush and bread and milk poultices to the various antiphlogistines, all of which I think are detrimental rather than beneficial, saying nothing of the discomfort of their use. I know that hot fomentations often relieve pain, so also cold applications frequently ease, but which do they assist, the infection or the inflammation? Outside of laxatives, tonics and general supportive measures, I do not believe there is much benefit derived from internal medication. When inflammation results in abscess formation and a distinct pus cavity forms, sometimes the shrewdest judgment and the most careful decision are necessary to give the patient the best treatment.

As a rule, as soon as an abscess is known to exist it should be opened and drained, providing its location is such that that can be done without subjecting the patient to a greater risk than the abscess does. In opening and draining abscesses we should have due respect and a full appreciation of the part the wall of that abscess plays in the protection of our patient. That wall should never be broken down or torn into, and always disturbed as little as possible, unless the pus cavity is limited to an organ that has been destroyed to such an extent that it must be removed. One of the most important places where the protecting wall must be carefully dealt with and the most delicate technic employed is in intraperitoneal abscesses. Hundreds and hundreds of patients have been sacrificed on account of injudicious judgment in those cases. Frequently the abscess wall consists of intestine, mesentery, omentum and posterior peritoneal wall. Whenever the inflammatory wall of such an abscess is torn into an intestine can be easily torn, or a fatal dose of imprisoned toxins may be liberated, or the infection spread to other parts of the peritoneal cavity.

I mention these common and well-known facts because there are men still operating who have no respect for the defensive and protective wall built up by the inflammation. Whenever an inflammation fills any of the cavities with an exudate to such an extent that the function of any organ is interfered with the fluid should be removed, whether it be in the pleural, pericardial, abdominal or cranial cavities. When occlusion of the larynx occurs intubate and let the inflammation have a chance to complete its work. In conclusion, I wish to say that I called attention to

this subject, not for the purpose of presenting any new thing, but to call attention and excite interest in this very important subject. Before I understood the modern conception of the significance of inflammation I was often in the dark and made some serious mistakes. It is my sincere hope that this subject will be more and more generally understood.

DISCUSSION.

Dr. Edward H. Ochsner, Chicago:—The paper to which we have just listened is one of the most scholarly efforts we have had at this session of the society, in that the author has grappled with the subject in the right way, and I think the statement that inflammation is a purely reparative process should sink into the mind of every physician. A great many men engaged in the practice of medicine look upon inflammation as an enemy rather than as a friend. The leucocyte is our friend, while the bacteria that get into our bodies are the enemies, and many practitioners have for many years been trying to excise the inflammatory area, removing the barrier between the micro-organism and the patient, between the invading host and life, and have killed thousands and thousands of patients. These patients have not died in spite of careful surgical interference, but they have died because of meddlesome surgery. This fact was impressed upon me about fourteen years ago when I was an interne at the Cook County Hospital, where the general practice was to attempt to cut out the inflammation. That would be all well and good if it could be done, but in the overwhelming majority of cases it can not be done, and if we attempt it we are liable to remove the barrier and kill the patient.

I believe with the essayist that rest is the first great requisite. If you secure rest for the affected part and give the inflammatory process a chance to wall off the infection the inflammatory process will win the battle almost every time.

I must differ with the essayist in regard to the use of local applications. If as he says, inflammation is a reparative process, let us do everything we can to assist this inflammation. Inflammation is practically a hyperemia, and I believe we can increase this hyperemia by various methods. One way of increasing hyperemia is by the application of heat; moist heat seems to be more effective than dry heat. For the past thirteen years I have used moist dressings consisting of saturated solutions of boric acid from 75 to 90 parts and 95 per cent. alcohol from 1 to 25 parts. A very large moist dressing of this can, with the extremity properly elevated, secure rest for the inflamed part, increase the hyperemia, decrease the venous stasis and introduces into the circulation an appreciable amount of boric acid, a substance which, while it does not destroy the pathogenic micro-organisms, does rob them of their virulence. Prof. L. Kahlenberg of the University of Wisconsin and myself have made some very interesting observations on this subject. We have found that when boric acid is thus applied to an inflamed extremity it appears in the urine in demonstrable amounts within two hours after its local application and continues to appear for a considerable time after the dressing has been removed.

In the last fourteen years I have had a great many cases of septic infection of the extremities. Among those cases which had previously been operated upon and in which the leucocyte barrier had consequently been destroyed I have found it necessary to amputate an occasional finger or toe, but so far have lost only one patient. Among those cases which came to me primarily I have never found it necessary to resort to amputation, nor have I had a single death, and I have not one single claw hand to my discredit.

Acting upon the simple proposition which the essayist has formulated, that inflammation is a reparative process, we must do everything to favor it, and as a rule pay very little attention to the micro-organism. If we give the leucocytes half a chance they will do this much more effectively than we can possibly do it.

Dr. Emil G. Beck, Chicago:—This interesting paper deals with a subject of such vast importance that we can only discuss one phase of it in the short time

at our disposal. We should differentiate between leucocytosis, which occurs in inflammation, and the reparative process which follows later. The leucocytes must be differentiated from the fibroblasts. They have an entirely different origin. The fibroblasts are furnished by the connective tissue later on, while the leucocytes travel to the seat of infection at once, and protect the area or enter into battle with the offending agent. The infiltration which takes place produces pressure in the area infected, and we must not underestimate the value of pressure as a therapeutic agent. We will find that the throwing out of lymph into the joints which are infected, into the pleural cavity that is infected, and the hardness of a beginning carbuncle, are simply Nature's methods of putting these parts to rest, and produce pressure, and here is the point I wish to make: The doctor, I believe, said we should withdraw fluid if it accumulates in a joint or in the pleural cavity. I do not agree with this entirely. It refills again in most cases, showing that Nature tries to do over again what she tried to do the first time. This should not be interfered with unless severe symptoms arise, such as extreme shortness of breath, which would interfere with life. Part of the fluid should then be removed, if not all of it. It follows that the pressure which we accomplish by the Bier treatment, by the natural hardening or infiltration of the tissues, should not be interfered with. Therefore, I would not advise cutting into a hard carbuncle. To illustrate: I had a carbuncle for two months; during that time it was incised four times, and every time it got bigger after incision and scraping. Later on I developed one near the eye. I was afraid to have it cut, and I called in a surgeon who wanted to incise it. I sent for a medical man, and he told me to apply compression, with this phrase: "The boil knew just exactly how big it would get, and then burst." This I did, and spontaneous rupture followed without leaving a scar. Since then I do not cut into a carbuncle unless there is a white point in it. That is the lesson I learned from this case. I have learned a good deal from this paper and the discussion of it.

Dr. Robert J. Christie, Quincy:—It seems to me there is still a confusion of ideas regarding these terms. Inflammation and the phenomena following it are quite interdependent. One belongs in the train of the other in natural sequence. I would take exception to what the essayist has said, and also to what Dr. Beck has just attempted to demonstrate. An original infection may vary from the irritation of a mechanical application to that of a most malignant infection. Of course, these processes should be treated in different ways by different methods. There is no one who will say that a syphilitic chancre can not be originally cured absolutely by early enucleation. This stands in opposition to what the doctor has said.

Of course, we are not called upon to discuss Dr. Beck's remarks, but it occurs to me the explanation of the cure of tuberculous peritonitis should be accepted in my judgment as explaining the thing that has been in question for many years. Is it not in opposition to what Dr. Beck contends for as the principle of treating effusion in joints, that cures the infection of tuberculosis in the peritoneum by this method? It removes the intraabdominal pressure, inducing capillary congestion, and carries out Bier's principle of artificial hyperemia.

Dr. Ferd Engelbrectson, Chicago:—It seems to me in this discussion we forget entirely the old teaching that in inflammation we have to consider two things. In the first place, if possible, remove the cause. No matter what we do in any kind of inflammation, until the cause or causes are removed, the inflammation will go on. In the second place, it is well recognized that inflammation, wherever it occurs, is an attempt on the part of the constitution to remove the cause or to relieve the damage, and this calls for interference in a good many cases where the constitution of the patient is not sufficiently strong to throw it off. This is well illustrated in such a simple case as a panaritium. If you leave a panaritium a few days, what will happen? The whole phalanx will be destroyed. I have seen a number of cases of that kind, where the inflammation, starting in the periosteum or distal phalanx, has been left alone, with the result that the whole phalanx has been destroyed, honeycombed, and had to be removed. I have

seen other cases where it has been attended to properly, by surgeons, the periosteum having been opened, assisting the inflammatory process in relieving the irritation; where there has been no damage done. We must remember that when an inflammation starts under a dense fascia or in closed cavities, where there is no outlet, there is certainly a call for surgical interference to let out fluid or pus. If this is not done the inflammation will spread in the direction of least resistance, and sometimes very vital organs may be interfered with, endangering the life or usefulness of the patient.

Dr. J. H. Bacon, Peoria:—It seems to me that we are using terms with entirely different meanings, and until we define our terms our discussion will not be as beneficial as it might be. We are passing through a period of change in our ideas in regard to inflammation since the work of Beers and Wright. Sufficient time has not elapsed to digest the new massive literature and work on this subject and allow us to find out the truth. I can not see why we should attempt to treat all inflammations in the same manner whether it be of the skin, fascia or periosteum, and without regard to the cause, whether it be following infection, physical or chemical trauma. I would ask the essayist how he would treat erysipelas?

Dr. F. C. Robb, Farmington:—Among the many excellent points presented by the essayist, the one that appealed to me was this thought, that inflammation is not a pathological condition. If, on the impulse of this occasion I was to frame a definition of inflammation, it would be this: A physiological reaction occurring in tissue made necessary for its protection, its reproduction, and its repair. To my mind, that definition fulfills every requirement, although it should be modified by a histological study of the phenomena presenting themselves in inflammatory reactions.

Let us take, for instance, in our study of the mesentery of the frog under the microscope. The first thought that might occur to us is this: According to the older definition of inflammation, every frog thus treated has a peritonitis. Why should that occur to us? Simply from this: We recognize what we consider a pathological condition. We consider it a pathological condition simply because we do not recognize what we see as reparative processes, or the phenomena that are made necessary to repair the injury that we have done to the point of investigation. What is the primary thing that occurs in these phenomena? An initial response followed by the other phenomena with which we are acquainted, if we study histologically those things that occur in the face of what we call inflammation.

There should be a physiological limitation of inflammation. What is the physiological limitation of inflammation? Its physiological limitation is that which is required to repair the injury that has been induced, and if the phagocytic power of the leucocytes is inadequate, what do we find? We find that Nature has provided another thing, namely, the bacteriolytic power of the leucocytes, which, if not capable mechanically, or by their chemotactic power of taking care of the pathological bacteria with which they come in contact, they die; and is their useful purpose served? It is not.

We have, then, the production of an antitoxin that destroys or limits to a certain extent the action of these pathological invaders. Now, as to the sequela following inflammation. Why do we have it? Simply because the reaction of the tissue is not and can not be sufficient to overcome the injury or the poison or whatever pathological condition which made it necessary to induce inflammation. We have an exudate. Why do we have this? Not because we have inflammation, but simply because the toxic or mechanical condition, or whatever it is, has been so great that it was impossible for the tissue to overcome the injury. These are sequences or sequelæ following.

Then, later, as has been referred to by Dr. Beck, we have other conditions coming on that take care of these things, that take care of the exudates, that repair the injury after the fight is over between the leucocytes and the pathological conditions, etc. With regard to effusions in joints, I was very glad to

hear what was said regarding that phase of the subject. Pressure is one of the greatest methods in overcoming exudates, if properly applied. Another point: These exudates many times act to lessen the virulency of the pathological condition which induced them. They often become antitoxic.

Dr. J. F. Cooper, Peoria:—I have been very much interested in this paper. I believe that local applications have some effect on inflammation, but they should be cold. I believe inflammations are infections always, and that germs develop much more slowly in a cold than in a warm medium. I use cold applications in erysipelas, in pneumonia, in appendicitis, where there is germ development.

Dr. Stremmel (closing the discussion):—I do not care to consume much of the time of the society in making my closing remarks. One of the speakers asked how I would treat erysipelas. At the meeting of the American Medical Association, held at Atlantic City last year, a very practical paper was read on that subject, and the idea was brought forth that bichlorid of mercury in moderately weak solutions in an acid medium was most beneficial. The idea is that erysipelas is due to an infection caused by the streptococcus erysipelatis, and the favorite location is in the lymph spaces under the skin; the germs propagate along there, and it is a nice place for them to stay, and the best treatment is that which will kill them.

DIAGNOSIS IN SPINAL AND CORD SURGERY.*

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CHICAGO.

This paper is intended to review only the essentials underlying diagnosis of surgical diseases and injuries of the spinal cord. Unlike the brain, whose several parts differ radically from each other in their functions, the spinal cord consists of a series of sections or segments superimposed one upon the other, as it were, each being similar to its neighbor above and below. It follows, therefore, that in the cord diagnosis is less complicated and mainly concerns itself with the breadth or cross-section and the height or level of the lesion. A cross-section of the cord presents tracts which conduct impulses to or from the brain and certain collections of nerve cells—the lower nerve centers—into which some fibers enter and from which others emerge.

Generally speaking, the peripheral posterior half subserves the function of sensation in its various qualities, while the anterior and lateral portions contain the motor tracts from the cerebrum and the beginning of the lower motor neurones in the anterior horns. Disease or injury, therefore, which affects primarily the anterior division of the cord gives rise to disorders of motion, and not until the posterior columns and horns have become implicated will sensory disturbances appear. Clinically this takes place in vertebral caries when the disease process extends to the cord structures, and it is also well exemplified in a fracture of the body of a vertebra which permits the sharp fractured edge to impinge

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*Read at the Fifty-eighth Annual Session of the Illinois State Medical Society, May 19, 20, 21, 1908.

upon the cord tissues. In both instances motor symptoms must of necessity predominate. On the other hand, when through direct or indirect violence the posterior division of the cord is injured, sensory disorders appear first and motor symptoms later. The careful observation of the sequence in which symptoms succeed each other is, therefore, of immense help in diagnosis. To understand the symptoms produced by lesions of the centrally situated portions of the cord, a short reference must be made to the physiology of the sensory tracts. To begin with, a posterior root contains the fibers carrying all qualities of sensation toward and into the cord; it is only after the same have penetrated the meninges and entered the cord that a division of labor takes place. Then we discover that some bundles conduct muscle and joint sensation, others tactile impressions, and still others pain and temperature sensations.

The fibers carrying impressions from the muscles and joints and a large portion of the fibers conducting tactile sensations from the skin are found in the posterior columns of the cord, the so-called Goll's and Burdach's columns, which have their termination in the same named nuclei in the medulla. But the fibers transmitting pain and temperature stimulation soon after entering the cord arborize about the cells at the base of the posterior horns. Their axones then cross over to the anterolateral area of the opposite side among the fibers of Gowers' tract and ascend to the optic thalamus, terminating eventually in the cortical sensory centers.

How do the foregoing facts explain the peculiar sensory phenomena of a lesion in or near the central portion of the cord? In such lesions beside the ordinary phenomena of motor paralysis which depend upon the degree of involvement of the motor tracts and anterior horn cells, we have peculiar sensory findings; while touch and muscle sensations are relatively unimpaired, pain and temperature conduction is either reduced or entirely abolished. The explanation is simple: The disease or injury being situated where the temperature and pain fibers must pass, impressions carried by them can not be transmitted to the sensorium, while the tactile, muscle and joint sensations traveling upward in the posterior columns are not at all affected. This symptom-complex has long been known as the syringomyelic sensory dissociation syndrome, but this term is no longer in use since we have found the syndrome in other conditions besides syringomyelia. In its purest form it is seen in hematomyelia and intraspinal tumor, springing from the central portions of the cord. The recognition of sensory dissociation is of great value in the differentiation of hemorrhage into the center of the cord—so-called hematomyelia, from hematorachis or hemorrhage in the membranes surrounding the cord. A knowledge of the decussation of pain and temperature fibers also helps to elucidate the Brown-Séquard syndrome often found in injury or tumor limited to one-half of the cord. This syndrome consists in the appearance soon after a trauma, or slowly in tumor, of motor paralysis on the affected and of sensory paralysis on the opposite side, but the sensory disturbance is usually limited to pain and temperature qualities. A word about the spinal reflexes. Each

spinal segment consists of one or more reflex arcs, consisting of (a) an afferent limb—the sensory fiber; (b) a center—ganglion cell in the anterior horns; and (c) the efferent limb—anterior root. As disease or injury at any level of the cord is likely to destroy the reflex arc situated therein, absence of the reflex in a certain segment points to disease at that level.

In the diagnosis of spinal injuries a knowledge of the differences between central and peripheral motor neurone affections is indispensible. According to modern teaching based upon the neurone doctrine, central neurone disease is characterized by the presence of spastic paralysis, exaggerated reflexes and Babinski phenomenon and the absence of atrophy and of electrical changes in the muscles and nerves, while peripheral neurone disease or injury manifests itself by flaccid paralysis, abolition of the deep reflexes and the altered electric response called reaction of degeneration. Bearing these points in mind we are able to diagnose paralysis from interference with those motor tracts merely passing through a certain segment, central neurone paralysis, from disease or lesion arising in the peripheral motor neurone having its origin in the anterior horns of each segment. Reasoning anatomically, we can also understand why compression of sensory roots by tumor formation, meningeal thickening, or a spicule of bone, causes the irritative symptom *pain*, and is usually followed by the symptom of destruction, namely, *anesthesia*.

Hemorrhage into the meninges, commonly a result of injury to the spinal column by fracture-dislocation or by extreme flexion, manifests itself in the sudden appearance of severe pains, radiating in character and limited to the areas of distribution from the affected segments. With the continuance of the conditions giving rise to this symptom there will probably develop sensory paralysis, anesthesia, and somewhat later motor phenomena of irritation and losses—spasms, twitchings, and finally paralysis of voluntary muscles and sphincters.

We may now discuss the means we have at our command to determine the exact level of disease or injury to the cord. As the spinal cord proper only extends to the termination of the first or upper border of the second lumbar vertebra, injuries of the spine below the second do not involve the cord. The meninges, however, reach the second or third sacral vertebra and if injured, may become inflamed. In localizing any lesion in the cord we must not forget that the nerve roots arise at a higher level than the foramina through which they leave the spinal canal. Our principal neurologic guides in determining the level of injury to the cord are (1) the state of the reflexes; (2) disorders of motion; and (3) of sensation.

1. Reflexes: When the cord has been completely severed, there is total loss of power, or paralysis of motion, below the level of damage; disappearance of the tendon reflexes and of all qualities of sensation in the same area, with sphincter paralysis. If the reflexes fail to return within a week, in any spinal trauma, we are probably dealing with a complete separation of cord structures, in which event operation will be

useless. In all incomplete lesions of the cord, on the contrary, the tendon reflexes, as a rule are much exaggerated below the lesion, while at the point of injury they are either reduced or entirely lost. It becomes, therefore, of importance to familiarize onself with the exact location in the cord of the various reflexes; tables of which will be found in every text-book on physiology.

2. Next to reflex disturbances the position assumed by the patient in bed after an injury to the spinal cord, may aid materially in the recognition of the level of injury. I quote the following succinct account from Allen Starr: "If the sacral segments are crushed, the patient is unable to move the feet and ankles, and hence the feet lie in an extended position, assuming the position of drop-foot. The thighs and knees can be moved in this condition. If the lesion involves the lower half of the lumbar enlargement, the patient lies with the thighs drawn up, the legs flexed, and he is unable to straighten the legs voluntarily or to lift the feet. If the lesion involves the entire lumbar enlargement, the patient lies with the thighs, legs and feet extended, and can not move them. If the lesion is in the dorsal region, the lower extremities are paralyzed more or less completely, but there is no tendency to drop-foot, and the limbs offer some resistance to passive motion, the tendon reflexes being exaggerated and the muscles somewhat rigid, unless there has been a total destruction of the cord, under which circumstances the muscles are relaxed and the tendon reflexes lost. If the lesion involves the first dorsal and last cervical segments the hands will be in a position of *main en griffe*, but the elbows and shoulders can be freely moved. If the seventh cervical segment is destroyed, the forearms are partially flexed and lie upon the body with the hands pronated. Voluntary movements of the wrist are impossible, but the elbow and shoulder can be moved. If the lesion lies at the sixth cervical segment, the arms are abducted from the side, the forearms are supinated, wrists and fingers being paralyzed. If the lesion is at the fifth segment the arms lie extended and relaxed at the side of the body, all motion being impossible."

3. Of the greatest value in determining the exact seat of compression by tumor, a blood clot, or a fractured vertebra, is a correct outline of the area of anesthesia. For this purpose several schemata are in use, which vary slightly from each other, but all agree in the main points. My own preference is for Seiffer's charts, which I find perfectly adequate for all sensory examinations. Into the blank chart the various kinds of anesthesia—touch, pain, heat and cold—are entered, the hyperesthesias noted, and then compared with the table constructed by Gowers. The latter indicates with a fair degree of accuracy the spine opposite which a given segment is situated. Some authorities believe that the rule to operate four inches above the highest point of anesthesia in the back is a good one and sufficient for practical purposes.

Chipault's working rule on the relation of the spinal processes to the origin of the spinal roots is easily remembered: "In the adult, in the cervical region add one to the number of a determined process to give the number of the root which rises at this level. In the upper dorsal

region, add two; from the sixth to the eleventh dorsal process, add three; in the lower part from the eleventh and the subjacent interspinous space they correspond to the last three pairs of nerves, the twelfth dorsal process and the subjacent spaces correspond to the sacral pairs."

Piersol's recent book gives the following more exact data: "The first and second cervical roots pass out of the canal almost horizontally. The intraspinal course of the succeeding nerve roots increases gradually in obliquity so that the spinous processes of the second, third and fourth vertebra correspond approximately to the level of the third, fourth and fifth roots. The seventh cervical spine corresponds to the first dorsal nerve root. The spinous process of the fifth dorsal vertebra is on a level with the seventh dorsal nerve, and the spine of the tenth dorsal vertebra with the origin of the second lumbar nerve. The first lumbar nerve arises just below the ninth thoracic spine, the second lumbar nerve opposite the tenth dorsal spine, the third and fourth lumbar nerves opposite the eleventh spine and the fifth lumbar and the first sacral nerves between the eleventh and twelfth dorsal spines, the remaining sacral nerves opposite the first lumbar vertebra."

Conus and Cauda Lesions.—The differentiation of lesions of the conus medullaris from those of the cauda equina is of especial practical importance because of the operability, as a rule, of lesions in the latter and the hopelessness of a lesion in the former. Both are frequent enough to demand more than passing notice. Although the length from coccyx to first lumbar vertebra, the end of the cord proper, is approximately equal to the distance from the first lumbar to the seventh cervical vertebra, there are still obscure points in the differential diagnosis between conus and cauda lesions. In the following I shall give a short review of what is best known under this heading.

According to Raymond, the conus begins at the point of exit of the third sacral root from the cord and terminates at the beginning of the filum terminale. This anatomical definition has been generally accepted, as no doubt anatomical and physiological differences exist between the third sacral segment and the segments higher up.

L. Mueller's studies prove that the anterior group of large motor cells has disappeared, the pyramidal tract has ceased to exist and no more descending degeneration can be observed in the third sacral segment, while the one above still supplies the last of the peroneal musculature. Minor accepts this view and insists that the portion immediately above Raymond's conus be called epiconus. He proceeds to give the symptoms of a lesion in each substantially as follows: Disease of the conus is recognized by negative and positive signs: one of the cardinal signs and that which distinguishes it from epiconus lesions is the negative symptom of complete absence of paralysis in the lower extremities. The positive signs are paralysis of bladder, rectum, sexual function, and, of course, the existence of perfectly typical saddle-shaped anesthesia. The symptoms of disease above the conus, he says, are more difficult to differentiate from cauda disease, but only when there is a complete trans-

verse lesion in that situation. However if the lesion be limited to the central portion or to the roots emanating from it, we have the following characteristic symptoms for an epiconus lesion. There are two negative and several positive symptoms. 1. The negative symptoms are—(a). Integrity of sphincter (situated in the conus). (b). Integrity of knee-jerks (4th and higher lumbar segments). 2. Positive signs. Paralysis from sacral plexus involvement, of which the peroneal nerve is most seriously and permanently affected. Reaction of degeneration occurs early. After the subsidence of the stormy symptoms there may be steppage gait, indicating the peroneal nerve affection. In addition, there may appear weakness in the flexors on the posterior surface of the thighs, as well as weakness and atrophy of the gluteal muscles, recognized by the peculiar wabbly gait.

In both conus and epiconus lesions motor paralysis is more limited and sensory and sphincter disturbances are more extensive than in cauda lesions. In the latter the sensory disturbance conforms more to the polyneuritic type; at first the pains appear upon movement only, later they come spontaneously, and eventually they give way to complete anesthesia for all qualities of sensation. Motor paralysis in cauda disease usually appears after sensory paralysis. In a doubtful case extreme and persistent pain speaks for caudal affection, while sensory dissociation and absence of pain favor the diagnosis of conus disease. The possibility for the occurrence of conus damage from trauma to the lower portion of the spine is given in the greater vulnerability of the central portion—the conus—and the relatively greater resistance of the coarse fibers surrounding it. It goes without saying that cauda lesions are amenable to surgical treatment, while conus disease is not benefited by operation because no regeneration seems possible in the cord.

100 State Street.

DISCUSSION ON THE PAPERS OF DRS. GRINKER AND BORLAND.

Dr. D. W. Graham, Chicago, was asked to open the discussion on these papers. He said: I do not think the subject of spinal-cord injuries can be too often presented to general practitioners, surgeons or neurologists. The field is rather difficult, both anatomically and physiologically. There is so much of it that it is difficult to remember in all its details, and it is a field of work we always have to be studying in order to keep abreast with the knowledge that is developed from time to time. Therefore, papers like these are in order frequently in medical societies.

The case reported by Dr. Borland interested me, because I recently had one of a similar type. In that case the evidence pointed up to the fact that the injury was caused by indirect force. There was forcible extension of the head on the trunk, fracturing the sixth arch, possibly also the fifth arch. It was a question whether to operate or not, but operation was finally decided on. I should say, however, that the findings on the surface were very much the same as the Doctor has described in his case as to anesthesia, loss of all sensation below certain lines, loss of motor power, sphincter paralysis, and partial paralysis of the upper extremity. After removing the fractured lamina, it was decided that there was no bone pressure. The membrane was intact and was split open for exploration. No blood exuded, but a little serum did exude, and there were small fragments of crushed spinal cord tissue from the slit in the dura. There was nothing further attempted. The patient died a week or two later.

The question was whether there was bone pressure which could be relieved by operation, and that question presents itself in many such cases.

Dr. Arthur D. Bevan, Chicago:—I have been very much interested in the two papers that have been presented, and there are one or two points that occur to me which I should like to speak about.

First of all, I believe thoroughly in the desirability of handling these spine and brain cases jointly by the internist or the neurologist and the surgeon. There should be a division of labor. The neurologist especially, or a well-qualified internist, who is a good diagnostician, should assume a certain amount of responsibility in these cases and assume to a large extent the matter of diagnosis, not that the surgeon should be merely an instrument in the hands of the internist or neurologist, because he should have for himself certain definite opinions and not operate unless he is convinced the diagnosis warrants it. At the same time, these cases are usually not such immediate emergencies but that the joint opinion of the neurologist and surgeon can be obtained.

One point in regard to the operative technic has impressed me very much, and that is many times in doing a laminectomy one who has not had much experience may waste considerable time in endeavoring to remove the laminæ by the saw or chisel or by various other instruments which are not of very much practical value. As a matter of fact, after doing twenty or more laminectomies, I have come to this conclusion, that the simplest and best method is an incision over the spine and the removal of the arch with rongeur forceps. The osteoplastic flaps are matters of surgical experimentation and are not satisfactory. The arch is of little moment and can be readily dispensed with, and should be dispensed with in the majority of cases.

Spinal-cord surgery cases naturally divide themselves under three heads—first, those of tumors; second, those of injury, and, third, such pathologic processes as tuberculosis. In traumatism of the cord I am not one of those who is in favor of immediate operation in all cases of broken back. I believe there are a certain number of cases where the lesion is so definite that there is an absolute crushing of the cord, where practically the bodies of the vertebræ are crushed and the cord cut off as if between the blades of a massive scissors. Where the injury is in the cervical region or upper dorsal region, laminectomy can be dispensed with, and it can be shown that in certain cases it is of little or no value. On the other hand, in certain other regions of the spine, as in the lumbar region, laminectomy should always be done. Injuries of the spine in the lumbar region are essentially like injuries pressing upon nerves and not upon cord tissue. Laminectomy should be done in the lumbar region, and then, of course, there is a certain class of cases midway between the two in which it is an open question, and when it is an open question I should give preference to laminectomy.

In cases of tumor of the spinal cord the diagnosis must be made, and the question is one of pathology. If the tumor is benign and not of long standing, as in a recent case which Dr. Harold N. Moyer and I had, the prognosis is excellent. A girl with multiple ossified enchondroma, one of which involved the fourth dorsal vertebra and about the size of an olive, pressing on the cord and producing complete paralysis, was operated on by laminectomy, the tumors removed by chisel, and the girl has practically recovered. She walks very well now, but she was completely paralyzed from a little below the nipple line, or about the ensiform cartilage. Of course, in the majority of cases we will find that these tumors are not benign, but malignant, and here the question of operation is one which should be duly considered, and one should be careful not to operate upon some secondary malignant lesions, as has been done a number of times.

When we come to spinal-cord surgery in connection with tuberculosis, where there are definite symptoms of pressure, pain and paralysis in tuberculosis of the spine; where, in spite of what we may do, the symptoms increase in severity, but the diagnosis is definite of tuberculosis, the open operation, with the removal of the granulation tissue and tuberculous débris, iodoformization and immediate closure is the operation of choice.

I think we are at the beginning of much of the surgery of the cord and the spine. I do not think we in this country have operated sufficiently often on these cases. I would not advocate unintelligent interference, but there certainly is a large field in cord and brain surgery which has not been as thoroughly worked up in the United States as it should be, but in order that it be done intelligently it must be done jointly by the internist, the neurologist and surgeon.

Dr. E. Mammen, Bloomington:—I desire to say a few words in reference to the question of early operation, and my observation is limited to a few cases of which I will cite one. There is a large class of these cases in which the injury consists simply of fracture of the arch, and it can be pretty well determined by the way in which the injury was received and by an examination of the case locally whether or not it is a fracture of the arch, so that in those cases there may be compression of the cord with complete paralysis of all parts below, or there may be the entrance of fragments of bone into the cord. It seems to me in all those cases operation should not be delayed too long. The case in point which I wish to cite is this:

A carpenter, who was engaged in building, fell down into a basement through a window, falling only a few feet, but sustaining an injury of the cord. Four weeks later his physician came to me for advice in the case. The accident occurred in a town thirty-five miles from Bloomington. After he had detailed the symptoms I advised that laminectomy be performed. The Doctor waited three weeks more, then sent for me to perform laminectomy. To make a long story short, laminectomy was performed. The injury was at the site of the arches of the fifth and sixth cervical vertebræ. The laminectomy disclosed a mere compression of the cord, and the injury was quite limited; yet the man had lain there paralyzed in all parts below. But after the operation there was partial restoration of sensation and partial restoration of motion in the lower extremities. However, the man succumbed to nephritis, decubitus and general infection. I can only say this: I believe if operation had been done within ten days or two weeks after the injury was received the patient would have recovered.

Dr. D'Orsay Hecht, Chicago:—I desire to express myself as in entire agreement with Dr. Bevan in his conservative attitude toward the injuries and the indications that arise for spinal surgery. I think he is quite correct in assuming that there should be a joint service between the internist or the neurologist, chiefly the latter, and the surgeon in setting as nearly as possible the indications for operative intervention.

I am at variance with the last speaker (Dr. Mammen), and I believe that this subject, as Dr. Bevan has stated, will require much more extensive study and careful exploitation in the literature before we can arrive at a very exact estimate of the merits of late versus early operative procedure. It is surely a fact that an irremediably damaged cord should not be interfered with.

Dr. Bourland has shown great familiarity with the literature and has cited the Stewart-Harte case as an instance of cord regeneration, but on approved neurologic opinion the case has ceased to attract serious consideration. The Stewart-Harte case was never one of injury to the cord, because no such an amount of regeneration as is claimed for that case could have occurred even if the cord was only slightly damaged. By some this case has come to be referred to as a "fake" case, but this attitude, reflecting, as it does, upon the integrity and sincerity of the gentleman reporting it, is too unwarranted to stand. It is, however, not too much to assert that this single, brilliant citation in the literature invariably referred to is now discredited by neurologists, or credited, if you please, only as an example of assumed regeneration of the cord.

I think it is the concensus of neurologic opinion that the spinal cord *per se* is absolutely incapable of any regeneration. Histologically, there may be the slightest proliferation of new fibers, but of functional restoration there is none. If we take into consideration the cases reported that tend to show some restoration of function, even then I believe the neurologist is inclined to be very conservative in his valuation of the damage done. Conceding a case to be amenable

to laminectomy, it should be thoroughly studied before that operation is contemplated. Even after it is proposed, one should wait two or three days, for the following good reasons: Laminectomy, of necessity, from surgical premises, changes a simple fracture, assuming we are talking of fractures of the spinal column with injury to the cord, into a compound fracture, and the element of sepsis is never so inconsiderable as to be entirely dismissed. Granting an asepsis most rigidly carried out, and none but the best antiseptic conscience, the element of infection is always to be reckoned with, and looms up large in the final estimate of total results.

As to the question of waiting to see whether the cord is damaged or not, I will say that the function of the cord may be seriously interfered with by so apparently simple a thing as a blood clot, or there may be edema of the cord without necessary invasion of the integrity of the cord substance, and we can not say but what the function of the cord may not undergo most severe impairment, although the anatomic disintegration may not be demonstrable. The master of spinal surgery—and I refer to Horsley—seems to prefer to wait two or three days before he assumes to do laminectomy, and then he is very, very careful in his prognosis, even after a laminectomy has been done under the most favorable auspices. The termination in the isolated cases referred to in this discussion shows conclusively, even when early operation is done, that the patient rapidly succumbs from decubitus, asthenia, and those other sequelæ which we have a right to expect.

The conservative stand now taken by neurologists is to wait, and after a thorough study of such literature as has been presented from time to time by Horsley, Tubby, Burrell, Oliver and Allen we may draw better conclusions as to the method of procedure than can be gained from isolated instances reported as brilliant successes by occasional operators. I believe that isolated case reports of successes have more than once led to false conclusions in surgical work, and, as Dr. Bevan has said, only a large collation of cases can properly decide the issue.

Dr. M. L. Harris, Chicago:—I wish to say a word or two on the conservative side of operating on spinal cord injuries. I have seen a number of these cases and have operated on several of them from the cervical region down. I believe these cases are divisible into two absolutely distinct groups—first, those in which the cord is absolutely destroyed. According to our present knowledge, these are absolutely inoperable, and we have never succeeded in doing one of them a particle of good. The other class consists of those cases in which the cord is not destroyed. Some of these have improved after operation, but it is more probable that every single one of them would have improved almost to a like degree had they not been touched. We can imagine a case where there is a spiculum of bone pressing on the cord, or where there is a clot pressing on the cord, and after removing it the condition of the patient would improve. These cases have not materialized in practice to any great degree.

So far as regeneration of the cord is concerned, there is at the present day no proof whatsoever that the cord has ever regenerated in the slightest degree. I believe that the first case—the Stewart-Harte case—was reported absolutely honestly, and we can excuse the burst of enthusiasm with which these gentlemen reported that case. I have had the pleasure of seeing the case and examining it, and I have talked with those gentlemen about the case. The case was presented to the Association of Clinical Surgery and all were given an opportunity of examining it. The gentlemen themselves are agreed that there is probably no regeneration in that cord, and that was the unanimous opinion of the members of that association who had the opportunity of examining it. I am, therefore, extremely skeptical about benefiting these patients by operating. By all means we should wait until it is determined whether the cord is absolutely destroyed or not. If it is destroyed, let the case alone, as no good will come from operating. If the cord is not entirely destroyed, some improvement will take place, and possibly that improvement may be hastened or perhaps a little bit increased by a judicious operation.

Dr. A. I. Bouffleur, Chicago:—One of the speakers has suggested that there is room for a great deal of light to be shed in regard to this whole subject. I may

be pardoned for mentioning the fact that there has been no light shed on the subject for the past fifteen years, and there is certainly as much room for more light now as at that time.

The discussion has drifted largely to the surgical features. I would like to emphasize the fact brought out by Dr. Harris that if the cord is destroyed there is no use in trying to do anything, but if the cord is not destroyed then comes the question whether or not we should operate. In other words, it is a question of diagnosis, and, therefore, Dr. Grinker's paper deserves a great deal more attention than we have given it. In fact, the whole matter is determined by the question of diagnosis, and I am sure that what he (Dr. Grinker) has presented will appear to be of much more value to us when we can read it deliberately and judge of its bearings on the various points.

There are two or three things from a surgical standpoint that are worth calling attention to further, and one is that there is quite a difference in the behavior of these cases as to whether the force has been applied directly or indirectly. Only a few years ago, when the subject was given considerable attention, a good authority at that time, Ashhurst, considered all injuries which involved the spinal cord, produced by indirect violence, as hopeless and inoperable. That, however, is not correct, because I have had two cases in which the force was so applied as to result in complete paralysis, both of which have been operated on, one as long as twelve years ago, and both have made good functional recoveries, with the loss of power in but a single group of muscles in each case. However, in those cases—and that is a point which I wish particularly to bring out—in which the cord is not completely destroyed there is a little time or a little history immediately after the injury which is of great value. It is for that reason we should inquire more definitely into the history immediately following the accident. In one case which I had the opportunity of seeing at the Alexian Brothers Hospital and operated on several years ago, there was complete paralysis of both motion and sensation at the time. The patient had been caught and rolled under a grip car, sustaining an impacted fracture of the upper lumbar vertebra, with complete paralysis, but getting at his history we were able to ascertain the fact that for a short time, an hour or two as I recall it, he was able to move one of his limbs. In that case the injury had not produced complete destruction of the cord, but the continued pressure had resulted in interruption of function. We felt warranted in operating on that case, and we did so, and in contradistinction to what Dr. Harris has said we found an impaction, with pressure, and a spiculum of bone extending clear through the cord. Notwithstanding these facts, the patient improved and in time recovered, with the single exception that his sartorius muscle on one side remained permanently paralyzed.

I recall another case in which a man was riding on a load of brick, and in stooping to go into the shed was caught and doubled up in jack-knife fashion, the injury resulting in complete paralysis at the time he was seen, but the history elicited the fact that he had some sensation for a few hours afterward. This patient was operated on, and the cord was flattened out between the body of the twelfth dorsal and the arch of the eleventh so as to completely interrupt its function. The condition was relieved, and the patient recovered, with the exception that the quadriceps was slightly weakened, so that he could not get up unless the limbs were at a right angle. If left alone he would have had permanent damage to his cord greater than he had sustained, for the reason that it was flattened out by the displaced vertebræ and persistent pressure on the cord and its nerves would in time have resulted in destruction. Shock is not a contraindication to operation in cases of cord injury any more than it is in strangulated hernia. The anesthetic is primarily a good remedy for the shock and the removal of the pressure which is constantly producing more shock is also beneficial.

There is no special difficulty in locating the lesion in spinal traumas, but as yet we have no positive means of differentiating between interruption of function caused by destruction and that produced by pressure. Since prolonged pressure may produce irreparable damage to the cord, the plain indication is to oper-

ate in all cases in which evidence of incomplete cord function persists and in those cases in which we are in doubt as to pressure or destruction existing, providing, of course, other conditions are favorable for the proper care of the patient. If pressure is the cause we can do much good; if destruction is present we can not do any harm, even death under such circumstances being a blessing.

Dr. S. C. Plummer, Chicago:—Dr. Grinker tells us that the diagnosis of these spinal injuries is easy, and I believe it is for Dr. Grinker and probably would be for us if we would give the matter sufficient study and examine our cases carefully. However, the surgeon who has a spinal case is very fortunate if a neurologist is available, and if one is he ought to call him to his aid. As a specific example of the diagnosis of spinal trouble with cord symptoms, I wish to refer briefly to a case in which Dr. Grinker made the diagnosis, and in which the diagnosis was confirmed by the operation which I performed. In this case the patient had abolition of the various kinds of sensation up to certain definite levels and abolition of motion up to certain definite levels, so that Dr. Grinker diagnosed the seat of the lesion as opposite the third dorsal vertebra, and the nature of the lesion as a tumor pressing upon the spinal cord. After exposing the dura mater and looking at it and also feeling of it, I felt that the neurologist in this instance was certainly wrong, because nothing abnormal was to be discovered. But on opening the dura mater, sure enough the diagnosis was confirmed. A small tumor was easily delivered from the dura, and the location of the tumor, as I have stated, was directly opposite the third dorsal vertebra. The tumor was of a benignant character, in that the report of the pathologist shows it to be a myxofibroma. The result of the operation was considerable improvement, but far short of a complete recovery. By all means, these cases should be joint ones between the surgeon and the neurologist.

Dr. Grinker (closing the discussion on his part):—I am very thankful for the privilege of having been permitted to listen to the excellent paper of Dr. Borland and the discussion on it. I am also thankful to the Secretary and Chairman of the Section for having been selected to give the a-b-c of this subject. From the discussion of Dr. Borland's paper it becomes apparent that the elementaries must be mastered before much progress can be made in spinal surgery. I am sure Dr. Borland has spent considerable time in getting the fine diagnostic points he has brought out, as all scientific surgeons are compelled to do. I wish to express my appreciation of Dr. Bouffleur's complimentary remarks, and I want to assure Dr. Plummer that it is to his skilfully performed operation that the patient really owed her improvement.

Dr. Borland (closing the discussion):—I do not think I have anything in particular to add except to thank the gentlemen who discussed my paper and to state that I had not been in possession of the later information in reference to the Stewart-Harte case, but I am glad, indeed, to learn it was not what it was first represented to be.

FRACTURE BASIS CRANII, WITH DIASTASIS OF LEFT TEMPORO-PARIETAL ARTICULATION, ENDING IN COMPLETE RECOVERY.*

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In considering the subject of fracture basis cranii, it is impossible not to include the bony vault in our deductions, inasmuch as fully two-thirds of all fractures of the skull include both the vault and the base.

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*Read at the Fifty-eighth Annual Session of the Illinois State Medical Society, May 19, 20, 21, 1908.

Neither variety is of much importance, *per se,* bony union taking place very readily, with a minimum deformity, and requiring no special skill in its essential treatment. They concern us chiefly because of the injury to the brain (meninges), cranial nerves, or blood vessels which they are apt to produce. Fractures of the base are justly regarded as more serious than fractures of the vault for two reasons: First, a greater violence is necessary to fracture the base, hence there is apt to be more cerebral disturbance; second, basal fractures often open into cavities which are extremely difficult, or impossible to keep surgically clean, namely, the naso-pharynx and the ear.

Case History.—Mr. G., aged 23, married, a switchman employed by the N. W. E. in Chicago, was coupling cars in the railway yards Jan. 5, 1908. Some mistaken signal caused the motorman on the front car to advance his train just as the switchman was raising his body from a stooping to an upright position, and the bumpers of the two cars which were to have been coupled caught the lateral aspects of patient's head and compressed them suddenly and violently. The switchman fell down on the tracks, vomited almost instantly and then lost consciousness for about ten minutes. When revived by his companions he was noticed to be bleeding from both nostrils and from the left ear. He was nevertheless able to board a train, ride half a mile and walk three blocks to the Ravenswood Hospital.

Examination One Hour After Accident.—Patient is in a condition of semistupor, but able to answer questions coherently. He does not know that his head was crushed by the car bumpers, but thinks he has received an electric shock, as he remembers "seeing a flash of light" before losing consciousness. Pulse 70-72, very full and bounding; temperature 97, respirations 24; pupils somewhat dilated but reacting sluggishly to light and accommodation. There is a band of contusion 2½ inches wide over both temporo-parietal regions; the left temporo-parietal region appears to be slightly depressed and there is a serrated bony ridge distinctly palpable in the same area, corresponding anatomically to the temporo-parietal articulation. There is no injury to the lobe of the ear or external auditory canal on either side, but blood and serum are oozing from the middle ear on the left side. There seems to be a bony mass external to the tympanum which prevents getting a view of this membrane. Blood is also flowing from both nostrils, but there is no injury to the nasal structure proper. Sphincteric control is present; there are no spasms, contractions or paralyses.

A diagnosis of fracture basis cranii with left temporo-parietal diastasis was made and patient prepared for an expectant line of treatment. The entire scalp was shaved and dressed, the nares and left ear cleansed and protected and patient put to bed.

Subsequent History.—January 5: 4 p. m., temperature 97, pulse 70, respirations 24. 5 p. m., temperature 98, pulse 70, respirations 26, profuse emesis, high tension pulse. 6 p. m., temperature 98, pulse 60, respirations 24. Bowels have moved and patient has urinated voluntarily. Complains of "hot and cold flashes" in head. 8 p. m., temperature 98, pulse 64, respirations 24. Emesis containing clots of blood (presumably swallowed after dripping into nasopharynx). 10 p. m., emesis, very restless, no spasms or twitchings. 12 p. m., temperature 96, pulse 64, respirations 24. January 6: Temperature 100, pulse 70 to 80, respirations 18 to 22. Patient quite rational, but complaining of severe pain in left side of head. Moderate edema of left eyelids; vision in left eye 75 per cent., impaired; patient can not distinguish any objects on closing right eye. No further emesis; gastrointestinal and urinary functions satisfactory.

January 7 to 9: Condition practically unchanged. Patient placed on potassium iodid, grs. xv, t. i. d., for its well-known absorptive powers. Temperature 98.2 to 100, pulse 52 to 57. Slight discharge of serum from left ear, no discharge from nares.

January 10: Complete paralysis of all branches of the left facial nerve observed. Headache requires analgesics. Severe left-sided conjunctivitis, no anesthesia of cornea or conjunctiva. Vision in left eye still impaired 75 per cent. No further discharge of serum from left ear.

January 14: Patient able to walk around hospital. Galvanization of left facial nerve began and continued daily.

January 17: Examination of the left ear reveals the presence, external to the tympanum, of a spicule of bone which occupies the upper posterior quadrant of the bony canal. This spicule is firmly attached by its base and does not apparently infringe on the tympanum. There is no impairment of hearing on the left side, and no attempt was made to remove the fragment of bone. Examination of the nasal cavities reveals the fact that there is complete destruction of the mucosa of the septum, with beginning erosion of the septal periosteum on both sides. Patient had complained, for the past week, of pain in the nose with frequent expulsion of large bloody scabs; he also has noticed total loss of sense of smell. There is no luetic history obtainable.

January 29: Keratitis of the left eye having slowly developed, I sent patient to Dr. W. H. Wilder, of Chicago, for a complete examination of the left eye. Dr. Wilder reported finding a slight grayness of the optic disc and a marked corneal opacity, the latter evidently due to external irritation resulting from inability to close the left upper eyelid. Following Dr. Wilder's suggestion, the left eye was kept firmly closed, and 5 per cent. argyrol irrigations given on alternate days. Patient still suffers from headaches and insomnia.

Improvement of the facial paralysis was steady, and by March 1 function had been completely or partially restored in all of its branches. Anosmia has persisted and will probably be permanent, but erosion of mucosa and septal periosteum have ceased under local treatment. The corneal opacity cleared up to a marked degree and patient could read large type without difficulty, although there was still a very slight haziness to vision in the left eye.

The headache and insomnia have entirely ceased. At present writing (i. e., four months after the injury) patient is mentally and physically normal, barring the anosmia and very slight corneal opacity which still exists; it is, therefore, reasonably certain that there will be no permanent mental changes such as we often find following serious cranial injuries. The diastasis of the left temporo parietal articulation still persists and is very readily demonstrable.

Careful analysis of the symptoms and findings in this case show that we had to deal principally with a fracture of the vault involving the left temporo-parietal articulation and a fissuring fracture to the base involving: first, cribriform plate of the ethmoid (anosmia, nasal hemorrhage); second, the orbital plate of the left frontal bone (subconjunctival hemorrhage); third, the petrous portion of the temporal bone (hemorrhage from left ear, facial paralysis). It is doubtful whether the optic nerve was involved in the injury; it seems more rational to ascribe the partial disturbance of vision to transitory cerebral hyperemia or edema.

Given a case of head injury, what are the most reliable signs and symptoms by means of which we can arrive at a positive diagnosis? By subdividing the findings into those which are common to all cranial lesions and those peculiar to fractures of the base, errors should be reduced to a minimum. Given in their order of importance the signs of cranial injury are:

1. Temperature: This is subnormal during the period of shock, and gradually rises one or two degrees as reaction sets in. A persistent rise of one or two degrees, associated with prolonged unconsciousness, indi-

cates epidural hemorrhage without serious cerebral injury (Phelps). A constantly increasing temperature, with possible recessions, indicates serious involvement of cerebral tissue. The degree of elevation of temperature and its persistence will measure the amount of injury to cerebral tissue.

2. Unconsciousness: The simple fact of unconsciousness is in no sense diagnostic, as it may occur equally well with or without fracture of the vault or base, in the presence or absence of any type of intracranial hemorrhage, with general cerebral contusion, cerebral laceration or combinations of two or more of these factors. The time of occurrence of unconsciousness, its duration and relation to associated symptoms, especially temperature, are of the utmost value in arriving at an accurate diagnosis. (a) An immediate loss of consciousness indicates shock or diffused contusion or concussion of the brain. (b) Unconsciousness preceded by a lucid interval, or restored consciousness followed by loss of consciousness always indicate an intracranial hemorrhage (extra-dural). (c) Prolonged or permanent or deepening unconsciousness associated with a rising temperature indicates a severe cerebral lesion; in the absence of high temperature we should diagnose severe hemorrhage. If occurring two to three days after the trauma we should think of a possible meningitis or meningo-encephalitis.

3. Respirations: Slow and shallow during period of shock. An irregular respiratory rhythm is usually associated with severe intracranial pressure (edema or hemorrhage) and an extremely infrequent respiratory act means a fatal injury to the medulla.

4. Pulse: The rapid thin pulse of primary shock is succeeded (excepting in rapidly fatal cases) by a retardation of pulse rate and increased tension, due to irritation of the vagus. A study of the pulse, therefore, merely denotes brain pressure, but does not help us to diagnose the corresponding agent or factor. In general, we may state that the quality of the pulse is of greater diagnostic value than its degree of rapidity.

5. Pupils: Statistics are totally unreliable and can be made to sustain or destroy any theory or line of argument. They may be pin-point or dilated, equal or unequal, responsive or irresponsive to light and accommodation; we may or may not observe nystagmus and ocular rotation, and ophthalmoscopic examination may reveal a choking of the optic disc. Absence of reaction is probably always of grave omen. In an analysis of 142 cases of basal fracture, Crandon and Wilson, of Boston, found a mortality of 92 per cent. in those cases having no pupillary reaction.

6. General or local muscular twitching or rigidity are due to cortical irritation of an epidural hemorrhage or to superficial laceration of brain tissue; convulsions are probably always indicative of severe brain injury.

7. Paralyses: When involving the entire voluntary musculature of the body, a fatal hemorrhage is almost always present. Monoplegias, hemiplegias, or paralyses of individual muscle-groups may be present according as pressure is made upon a limited area or upon an entire hemisphere.

8. Loss of rectal and vesical control, which should always make us suspect serious injury to brain tissue.

9. Palpable evidences of fracture of the bony vault. "Whether the wound of the bone is compound or simple, open or closed, is of comparatively little importance to-day, because of the very general recognition and employment of aseptic and antiseptic methods. It is a generally accepted fact that the skull may be simply contused and the lateral sinus ruptured, with resulting fatal hemorrhage. It is likewise true that the bone may present but a fissure, but if that fissure crosses the middle meningeal artery, or any of its branches, they may be torn across and the consequent hemorrhage and associated intracranial pressure will prove disastrous unless checked by surgical interference; on the other hand, the bone in the frontal region may be greatly damaged, literally crushed, and yet no grave symptoms arise" (Scudder). While not wishing to minimize the importance of ascertaining, if possible, the variety and extent of the bone lesion, it seems to us that too great stress is laid on the fracture itself and too little on the much more important clinical deductions obtainable by a close scrutiny of the temperature, state of mind, respirations, pulse and paralyses. Of 78 cases of meningeal hemorrhage reviewed in 1906 by Dr. F. Gregory Connell, of Salida, Colo., 32 cases, or 40 per cent., had no fracture of the bony vault.

The cardinal signs of basal fracture are:

1. Hemorrhage or escape of cerebrospinal fluid into the cavities of the eye, naso-pharynx or ear. Of 530 cases of fracture of the base found in the records of the Boston City Hospital, 75 per cent. had hemorrhage through one or more cavities. When the fissure involves the anterior fossa of the skull, blood will reach the orbit, giving rise to ecchymosis of the lids; there may also be greater tension of the eyeball upon the affected side. Bleeding from the nose indicates fracture of the cribriform plate of the ethmoid, provided injury to the nasal bones can be excluded. Case No. 163 in my elevated railway service illustrates this point very forcibly: A train conductor was found lying on the elevated tracks in a semi-unconscious condition, having evidently fallen from his car while leaning out of an open gate. When examined two hours after the accident, the following facts were noted: Temperature, 98; pulse 70, and of a high tension; the mental condition is that of mild stupor; respirations, 16; the pupils are slightly dilated, equal, and react very sluggishly; there are no paralyses or twitchings; emesis has occurred once. There is free hemorrhage from both nostrils, and there are contused wounds over the left supraorbital angle, left malar bone, left side of chin and left side of nose. Palpation of the nose reveals fractures of the nasal bones and nasal cartilage, and intranasal illumination reveals the source of hemorrhage to be extracranial. A subconjunctival ecchymosis developed on the left side within twelve hours. Patient made an uneventful recovery.

When the middle fossa is involved, including the petrous portion of the temporal bone, the tympanum may be torn and hemorrhage appear at the external auditory meatus. In involvement of the posterior fossa

there may be hemorrhage into the pharynx or the formation of an ecchymosis under the posterior pharyngeal mucosa. A hematoma may also appear at a later date in the posterior cervical region.

2. Involvement of cranial nerves.

1. Olfactory nerve: Temporary anosmia is common; permanent anosmia rare (Crandon and Wilson).

2. Optic nerve: Postmortem statistics prove that most fractures near the optic foramina tend to pass either between them or external to them through the sphenoidal fissures. Hence immediate loss of sight from basal fractures must be extremely rare. This statement is, however, difficult to prove, owing to the mental state of these patients. Whatever disturbance of vision may be present in these cases must be ascribed to pressure from hemorrhage or cerebral edema,

3. Trifacial nerve: Involvement of its ophthalmic division is not uncommon. The subsequent anesthesia of the cornea usually leads to ulceration.

4. Facial nerve: Because of its passage through the petrous portion of the temporal bone, the facial is more commonly involved than any other cranial nerve (28 per cent. of cases analysed). Paralysis is rarely noticed before the third day and may not appear for a week. All of its branches are involved. Under appropriate treatment most cases recover completely.

5. Auditory nerve: Owing to its intimate relation to the facial nerve in the internal auditory canal, both nerves are usually affected in fractures which involve the middle fossa. The exception to this rule in my case may possibly be due to the spicule of bone forced into the external auditory canal at the time of the fracture, thus liberating the auditory nerve while still impinging on the facial. Deafness may occur early and be transitory. Where the ossicles are severely damaged or where the whole inner auditory apparatus is shattered by fracture, we have permanent deafness and permanent facial paralysis.

Diagnosis: By analysing the symptoms in their order of importance, a fairly accurate diagnosis of the lesion or lesions within the cranial vault may be arrived at. Leaving out of consideration the minute pathological changes which may take place as the result of head injuries, the following questions should be answered in every case:

1. Is there definite evidence of traumatic communication between the cerebral tissues and the external atmosphere? We should never forget that many fractures of the base are minute fissures which open and close instantly.

2. Is there evidence of epidural hemorrhage (moderate temperature, lucid interval followed by unconsciousness)?

3. Is there evidence of subdural hemorrhage with its associated diffuse cerebral edema (progressive rise in temperature, prolonged or deepening unconsciousness, loss of sphincteric control, focal symptoms)?

Prognosis: Our prognosis in cases of extreme severity may sometimes be of value; in the mild and moderately severe cases it is mere guess work. Prognosis should always be extremely guarded. Many desperate cases recover; and many apparently mild cases succumb unexpectedly.

Treatment: Perforating, comminuted or depressed fractures demand early intervention, except in those cases which are manifestly moribund. In Case No. 6 of my N. W. E. series, the patient was struck by a motor car and thrown a distance of fifteen feet. He sustained a comminuted fracture of the left parietal bone, radiating to the anterior and middle fossæ. He was bleeding profusely from the middle meningeal artery, besides suffering from serious visceral lesions. At the earnest solicitation of his friends, I removed the comminuted fragments and tied the bleeding artery. Patient died within an hour. This case is merely mentioned to condemn the all too common tendency, among many surgeons, to operate on palpably hopeless cases. This should never be done unless the patient's relatives or friends are clearly given to understand the small chance of relief following operation, and, so understanding, still request it. In the Crandon and Wilson series of 530 cases already referred to, 59 were operated upon with a mortality of 53 per cent. Less discredit would be laid at the surgeons' door if only those cases were operated on in which (aside from pressure of bony fragments) extradural hemorrhage seems to be the essential part of the clinical picture. The greatest difficulty in arriving at a decision will always be encountered in the so-called mixed cases where the clinical picture points to cerebral contusion complicated with epidural hemorrhage. It is here that the surgeon's acumen and judgment will be tested to the utmost; operation will then depend upon his estimated relative importance of the lesions. When tempted to open a skull without having previously carefully observed and weighed the clinical picture of the case, it might be well for the surgeon to remember that his patient may later develop a postoperative meningitis or a hernia cerebri, where he probably would have made an uneventful recovery had his calvarium been allowed to remain intact.

All cases of head injury should be sent to a hospital with the least possible delay, or prepared for the expectant line of treatment in the surgeon's office and then put in charge of a competent nurse for at least 48 hours, better still for a week. The temperature, pulse, respirations, mental condition, and condition of the sphincters should be noted at least every two hours until operative interference becomes indicated or the case is manifestly tending toward spontaneous recovery. The expectant treatment should always include shaving of the entire scalp and cleansing of same; cleansing the ears and nares and plugging the former with sterile cotton. Where emesis is often repeated, high colonic flushings containing salines, or croton oil dropped on the tongue will lower blood pressure through depletion. In cases showing a tendency to spontaneous recovery, but in which the clinical picture suggests the probability of a mild epidural hemorrhage or a limited cerebral contusion, moderate doses of potassium iodid should be given and maintained until complete recovery. Galvanization of paralyzed muscles should be begun as soon as the acute symptoms have disappeared, and should be kept up over a considerable period of time. By so doing we maintain muscle activity, and, to a large extent, prevent atrophy of disuse.

SUMMARY.

1. Prepare all head injuries surgically.

2. Place all such cases under the very keenest observation obtainable.

3. Do not operate in cases of diffuse cerebral contusion. A progressive disintegration of cellular structures can not be restrained by a simple relief of pressure (Phelps).

4. Never operate hurriedly without having first observed the important symptoms of your case and their trend, i.e., increasing severity or manifest tendency to spontaneous recovery.

5. Having diagnosed epidural hemorrhage, if coma deepens, temperature declines and pulse grows weaker, operate at once; if, with reaction, the clinical picture shows a tendency to remain stationary or to clear up, wait and watch. Not all blood clots need surgical removal in order to affect a complete recovery.

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TRAUMATISM OF THE BRAIN.*

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AURORA.

At the present time, when the shelves of public and private libraries are groaning under the ever increasing load of new volumes and new journals, and medical schools are constantly turning out countless thousands of new and up-to-date practitioners, it would be presumptuous on my part to attempt to offer anything new or original on this important subject. I have only attempted to call to your minds the position assumed by those who speak and write with some degree of authority on traumatic injuries of the brain. As tersely stated by the late Senn, there is no department of surgery in which the general practitioner is more interested than in fractures of the skull and injuries to the brain.

According to Gurlts' statistics of the relative frequency of fractures, of 51,938 cases of fracture treated at the London Hospital, 757 or 1.45 per cent. were fractures of the skull. In the tabulated calculations of

*Read at the Fifty-eighth Annual Session of the Illinois State Medical Society, May 19, 20, 21, 1908.

Von Brun's, out of 8,560 fractures, 292 or 3.4 per cent. were fractures of the skull. Recently Chudovsky compared the above figures with those he had taken from the second surgical clinic of Budapest. Out of 2,366 cases, 90 were fractures of the skull, or 3.8 per cent. The consensus of opinion seems to be that from 2 to 3 per cent. of all fractures are fractures of the skull. Sixty per cent. of all fractures of the skull occur between the ages of 20 and 40 years and they occur nine times more frequently in men than women. Fifty per cent. of the cases were caused by falls, 35 per cent. by blows or kicks and 9 per cent. by being run over. Fifty-two per cent. were fractures of the vault of the cranium and 47 per cent. fractures of the base. Fractures of the vault were simple in 32 per cent. and compound in 67 per cent. The fractures of the vault were located in the frontal bone in 44 per cent., in the parietal in 40 per cent. and only 2 per cent. in occipital bone.

Fractures of the skull are classified the same as in other bones: First, simple, compound, comminuted and complicated; second, complete and incomplete; third, direct and indirect. They may be again divided into fractures of the vault and fractures of the base, linear or fissured, punctured or depressed, etc. Fractures of the base are usually simple and linear, while those of the vault are not infrequently compound, comminuted, depressed or punctured. Both are usually caused by direct violence and while both may be complicated or non-complicated, a complication in fracture of the base is more frequent and not only occasions differences in prognosis, but in methods of diagnosis and requirements of treatment.

Senn has stated the life and well-being of the patient depends upon prompt, rational surgical treatment based on a correct diagnosis. The injury that produces the fracture frequently causes at the same time severe intracranial lesions which constitute the main reason for life-saving operations. The fracture involves either the entire thickness of the bone or may be confined to the outer or inner table. Von Bergmann in his work on injuries of the head mentions 30 cases of fracture of the inner table without any apparent injury of the external table.

We distinguish according to the character of solution of continuity of bone, the following forms: First, linear or fissured fractures. These are analagous to the crack in the plate. The bone is merely cracked without there being present any displacement. Second, comminuted or fragmented fractures, where the lines of fracture intersect so as to isolate separate particles of bone. The entire vault of the skull may be shattered into numerous fragments. Hoffman, Buchner and others have reported cases in which the skull was broken into 20, 30 or even 90 pieces. We distinguish between fractures with and fractures without depression. When the fragments of bone, whether of the entire cranial thickness or of the inner table alone are driven below their spherical level, they are spoken of as depressed fractures. Third, perforating fractures, or fractures with loss of substance occur when the fragments at the seat of penetration have been carried away leaving a defect. They are usually caused by gunshot injuries or by penetrating hooks, etc.

MECHANISM OF THE FRACTURES OF THE VAULT.

The fact should be borne in mind that the bone itself and the skull as a whole are elastic. The elasticity of the bony tissue is that quality by virtue of which these tissues resume their original form when distorted by stress or strain. The action of pressure or a blow upon a certain portion of the skull causes it to break as soon as the limit of the elasticity of the bone at this point is exceeded. If this latter does not occur, the bone returns to its normal position. When force is applied over a large surface, as in a fall from a height, or the vault is struck by a blow from a broad surface, the skull is compressed in the direction in which the force acts and lengthened or pulled apart in a direction at right angles to this. If the force is applied to the vault, the vertical diameter is shortened and the occipitofrontal and biparietal diameters are increased. Two kinds of fracture may result. Compression fracture at the point where the force is applied and a bursting fracture at those points where the skull has been lengthened and pulled asunder. This form of fracture is caused by indirect violence and at a point where the original force did not act. It was formerly thought that indirect fractures of the skull were fractures by *contre coup*, that is it was thought that the vibrations of the skull wall became concentrated on the opposite side of the head in such a way as to cause a rupture in the continuity of the bone. Bergmann, Messerer and others have proved the incorrectness of this theory.

COURSE.

A fracture of the skull is not in itself dangerous to life. Its seriousness depends on two frequent complications. First, injury to the brain and its appendages, and second, subsequent wound infection. Fractures of the base are, as a rule, more dangerous than those of the vault. The dangers of concussion of the brain, intracranial hemorrhage, cerebral pressure, contusions, wounds and rupture of the brain are common to all fractures of the skull. The dangers of purulent cellulitis, osteomyelitis, meningitis, cerebral abscess, etc., are peculiar to compound fractures with division of the soft parts down to the bone. In order to properly apply therapeutic measures we must determine whether or not the skull contents are involved in the injury.

DIAGNOSIS.

The diagnosis of fractures of the skull requires evidence of solution of continuity which may be obtained directly in cases of fractures of the vault and indirectly in fractures of the base. Compound fractures of the vault are readily determined, as the line of fracture can be easily seen and felt. It is true that very small fissures are hard to make out, but if the fissure communicates with the air, the blood can be seen to ooze from the line of fracture. Localized tenderness along the line of fracture is an important diagnostic symptom if the patient is perfectly conscious. Cerebral manifestations accompanying fractures are of little assistance in making a diagnosis. They are merely the result of

brain lesions and have nothing to do with the fractures themselves. In simple fractures, only palpation of the surface of the skull is of aid in discovering a fissure, the edge of a fracture or an area of depression. Deformity can only be appreciated by the sense of touch when it is of considerable depth. When of a mild degree, it may be masked by the thickness of the soft parts. In palpation of the skull, care should be exercised not to mistake sutures, wormian bones and depressions either congenital or due to atrophy of the bone for fractures. The existence of focal symptoms is of special diagnostic value in fractures of the base of the skull. Difficulty in examination arises frequently in connection with contusions of the soft parts which may lead to the assumption that the bone has been depressed where no fracture exists. A flat hematoma with a hard, firm base is frequently taken for fracture. The subjective symptoms are of little assistance in making a diagnosis, as the injured party is usually in no condition to answer questions. Concussion of the brain is rarely absent, but it is more frequently present where fracture of the skull does not exist.

In subcutaneous fractures, the diagnosis can only be made when depression is marked or where fragments have been broken loose. Depressed pieces of bone may be hidden beneath the temporal muscle or beneath a hematoma, consequently many such fractures of the cranial vault remain undiscovered. The welfare of the patient is seldom dependent on a positive diagnosis of subcutaneous fracture, as the treatment is only that of the complicating injuries. Formerly it was considered imperative to make incisions into the soft parts and expose the bone in order that fractures should not remain undiscovered. Senn, Cooper and others have severely criticized those surgeons who are willing to change a simple fracture into a compound for the sake of diagnosis. Operative interference is only necessary on account of lesions of the brain and not because of the fracture itself. It was formerly the custom to determine the degree of splintering of the inner table by passing probes or sounds through the fissures in the outer table. This is a dangerous practice and should be proscribed. We should bear in mind that the diagnosis is made for the purpose of treatment and that probing is not only useless, but is positively dangerous. The diagnosis of isolated fractures of the inner table is very uncertain. For therapeutic reasons, it is important to recognize displacements, depression and movable fragments. The removal of pointed splinters may be necessary if they are directed against the brain. The symptoms of fracture of the base are as indirect as those of the vault are direct. By the knowledge obtained of the process of occurrence; by the history and observation of the site of injury, the surgeon is not only able to determine the presence of fracture, but its course and extent as well. The following points in their diagnosis are important. First, the spreading of hemorrhages from the site of fracture to certain points under the skin where they appear as ecchymosis. Second, the flow of brain tissue, blood and serous fluid from those cavities adjoining the base. Third, the disturbance in function of those nerves situated at the basilar surface.

PROGNOSIS.

Prognosis in fractures on the base of the skull is always grave. Owing to the inaccessibility of the intracranial lesions to surgical treatment, and, in compound fractures, the difficulty in preventing infection through the wound from without. The danger in all fractures of the skull depends upon the location and extent of brain lesions and intracranial hemorrhages and if the fracture is compound, infection of the wound. Wound infection is prone to result disastrously if the meninges of the brain are ruptured and the infection reaches the piamater and surface of the brain, where it spreads rapidly, and as surgical treatment has only slight control over this affection, the patient succumbs in a few days from septic leptomeningitis. If the brain wound implicates important nerve centers, death may result from paralysis of vital nerves. Again, if the wound affects less important locations, large quantities of brain tissue may be lost by the injury or later removed by the surgeon without serious consequences. Finally, as quoted by Senn, "no injuries of the skull are too extensive to be despaired of and none too slight to be ignored."

TREATMENT.

The treatment consists above all in preventing intracranial disturbances, and remedying them as far as possible in case they are already present. Simple fractures of the vault are treated by rest in bed in case there are no special cerebral symptoms. The intact covering of the skin is the best barrier to infection at the site of injury. Operative treatment of fractures of the skull is limited to cases in which it becomes necessary to elevate or remove depressed fragments or removing foreign bodies and exposing to direct treatment, grave intracranial lesions. Rest in bed with the head elevated must be enforced in all cases until the danger of complications has passed and in fractures of the base until the injury to the bone has been repaired. The primary disinfection of the wound should be the indication for surgical interference and not the fear of unfavorable results in consequence of depressed fragments. The removal of splinters or trimming the edges of the perforating fracture should be carried out in every case where it may be assumed infectious material has entered the cleft of a fracture. The removal of bone should be considered only as a part of a thorough primary disinfection. This should be the principal purpose of the surgical treatment.

In every compound fracture of the skull the examination should be preceded by shaving and disinfection of the entire scalp. The wound should be cleansed of all dirt, foreign bodies of all kinds, including hair, pieces of skin entirely or partially detached, shreds of fascia and connective tissue. Disinfection should be followed by arrest of all hemorrhage, the wound should be absolutely dry before it is closed or protected by dressings, blood should not be allowed to collect in the bottom or corners of the wound. The fracture itself should be disturbed as little as possible, especially in the case of extensive comminutive fractures. Fragments of the bone which are still connected with the

periosteum and duramater should be left in place and only those about whose preservation there is any doubt should be removed. In case the meningeal artery is injured it should be exposed and ligated. Bergmann is very much in favor of suturing the wound at once, while other surgeons prefer not to close it at all or only partially by means of tension sutures. The more thorough the asepsis, the more justified one is in closing the wound. In case of loss of substance of the soft parts, it is advisable to cover the site of fracture with skin flaps. The wound should be dressed with the usual asceptic surgical dressings and the patient watched carefully during the further course of the treatment.

Trephining of the skull must be reserved for the following fractures: First, subcutaneous fractures, with marked depression. Second, subcutaneous fractures attended by focal symptoms. Third, all compound fractures, including punctures and gunshot fractures. Fourth, fractures compound and subcutaneous, complicated by hemorrhage from the middle meningeal artery. The treatment of fractures of the base is purely symptomatic, and resolves itself into the treatment of contusion or compression of varying degrees and consists in uncomplicated cases of rest in bed, light diet, regulation of the bowels, icecap to the head when indicated, the same as in simple fractures of the vault. For the fracture itself nothing can be done. Operative measures are impossible, as one can not reach the site of fracture.

INTRACRANIAL LESIONS.

The traumatic intracranial lesions, whether they occur independently or as complications or sequels of cranial fractures, can not be predicated on the amount of violence inflicted. Injuries received by falls upon the head from great distance or from a mere stumble upon the street may be in either event trivial or disastrous. The force in one case may be broken and its final impact minimized, and in the other fully conserved or exaggerated by attendant conditions. Intracranial lesions may be classified as hemorrhages, thrombosis of sinuses, contusions, lacerations and their sequelæ as meningeal and parenchymatous, inflammations usually of a septic character.

HEMORRHAGES.

Injuries to the intracranial blood vessels lead to either external hemorrhages, as in compound fracture, or extravasation of blood inside the cranial cavity. In the latter case the extravasation may take place between the duramater and the bone, or beneath the dura and soft coverings of the pia and arachnoid, or finally in the brain itself. The external hemorrhages or those between the dura and the bone are most commonly the result of injury to the sinus, the middle meningeal artery and occasionally the internal carotid. Wounds of the middle meningeal artery may occur in various ways. The simplest and most common form is by a sharp pointed instrument after it has penetrated the soft parts and bones of the skull or from gunshot injuries. The middle meningeal artery is the largest branch of the internal maxillary and enters the cranial cavity through the foramen spinosum and runs in the

grooves of the inner surface of the skull between the dura and bone. It divides into an anterior and posterior branch. The anterior passing to the frontal region, the posterior crosses the petrous portion of the temporal bone and reaches the occipital bone. In fractures of the skull, the artery is torn with the division of the bones or is injured by sharp edges or splinters of bone. It may also be torn without a fracture of the skull and again it may be torn at a point far from the site of fracture. The natural consequence of injury of the meningeal artery is hemorrhage. The effects produced differ according to whether the blood can escape freely or accumulates within the cranial cavity. In the former case, bright red blood can be seen pouring from the wound or on removing the depressed fragments the spurting artery may be distinctly seen. In the latter case, where no fracture exists, the blood collects between the dura and the bone, causing a hematoma. The hemorrhage continues until the artery is closed by a thrombus or until the intracranial pressure equals the blood pressure within the artery.

The symptoms are more or less referable to compression of the brain and it is only the particular location of the blood clot that determines a definite clinical picture. The symptoms of intracranial hemorrhage are due in part to intracranial pressure and part to localized pressure. The former are general symptoms consisting of disturbances of consciousness, changes of pulse and respiration. The latter are local and consist of disturbances of power of motion or of sensation, further disturbances in speech, the pupils as well as the fundus of the eye. The most important symptoms are the mental disturbances, especially the so-called free interval which is characteristic of all extensive intracranial hemorrhages. The patient feels comparatively well directly after the injury, but in a short time symptoms of compression make their appearance, which are due to an increase in the amount of hemorrhage. These symptoms consist of headache, nausea, vomiting, restlessness, lassitude, stupor, then sleep, coma, slowing of the pulse, etc. If hemiplegia occurs immediately after the injury, it is due to injury of the brain in the motor region. The treatment of injury to the middle meningeal artery consists in prompt operative measures and ligation of the artery. Injuries to the sinuses are either ruptures due to fractures of the skull or they are caused by incised punctured or gunshot wounds or penetrating splinters of bones.

The superior longitudinal and lateral sinuses are most likely to be injured on account of their location. If after injury to a sinus the blood can not escape externally, the dura is lifted away from the bone and symptoms of compression result. The latter develop much more slowly than a hemorrhage from an artery. The only sign of injury to the sinus combined with an external wound is the pouring out in a steady stream of large quantities of venous blood. The treatment consists of a strict antiseptic technic where the injury is complicated by an external wound particularly on account of purulent phlebitis. The hemorrhage can usually be controlled by packing with iodoform gauze.

Whenever intracranial accumulation of blood produces pressure symptoms and a diagnosis has been made, trephining and evacuation of the blood clots are positively indicated.

CONTUSIONS.

Contusions of the brain are caused solely by various kinds of violence and most commonly occur in connection with concussion of the brain and changes in form of the skull with or without fracture. In mild concussion there are present no structural changes in the brain. Where concussion is greater, we speak of it as contusion. The degree and extent of contusion of the brain are extremely variable. They may be merely punctate hemorrhages, contused areas the size of a walnut, or the entire lobe of the brain may be involved. The injured portion of the brain is usually situated at the point where the violence is applied to the skull, but it may be at points far removed from the site of injury. In bursting fractures the accompanying areas of contusion of the brain usually lie in the direction of the inflicting violence, being more severe at the poles of the line of force. A fall on the occipital region may cause contusion of the frontal lobe and a fall on the parietal region, a contusion of the base with or without injury to the brain at the point violence is applied.

WOUNDS.

Wounds of the brain may be divided according to the cause or force that produces them into contused, punctured or lacerated wounds. Wounds of the brain, according to von Bergmann, possess one common feature, namely, that the violence has divided all the coverings of the head, the skull and brain itself so that there is an opening from the external surface of the body to the central organ sufficiently wide to allow the escape of brain substance on the one hand and the entrance of air and infectious germs on the other. Contused wounds of the brain are most frequently found as complications of compound fractures of the skull. Punctured wounds are frequently combined with fractures of the inner table. They may also be caused by foreign bodies entering the skull through the orbit, nasal cavity or directly through the cranial bones. Lacerated wounds are usually limited to the cerebral cortex and the depth of the wound usually depends upon the keenness of the blade and the force applied in producing it. Symptoms caused by injuries to the brain consist in functional disturbances of the injured portions of the brain or localized cerebral symptoms. While in concussion, general symptoms affecting the whole brain are present, injury to a definite portion of the brain is followed by local disturbances or so-called focal symptoms which appear immediately after the injury. Very frequently contusions and wounds of the brain are combined with concussion or compression and these conditions completely obscure the symptoms which the localized lesion would have produced. Again, there may be several traumatic areas situated in different places in the cerebral cortex or medullary substance of the brain.

In order to correctly interpret the manifestations caused by localized brain lesions a knowledge of brain anatomy and physiology is absolutely necessary. It is not within the scope of this paper to enter into the minute details of cerebral localization. Reference to any of the standard works on the subject will suffice and it is only necessary to mention the more important sensory and motor areas which have been accurately mapped out. Thus first, sensory and motor areas, second, such disturbances as may affect the special senses. An interesting phenomena presents itself here in that the speech center (Broca) is not located uniformly on the same side in all individuals. It has been demonstrated that in left-handed individuals it is on the opposite side and vice versa. Hence, this peculiarity must be considered in making diagnosis of cerebral injuries. The nuclear regions of the cranial nerves are found in the crus cerebri, pons, and medulla oblongata. Hence, any disturbance of the function of these nerves must point to a pathological or traumatic condition of one or more of these areas.

TREATMENT.

Treatment of traumatism of the brain resolves itself into surgical and palliative. The surgical treatment of a lesion of the brain presupposes its diagnosis. If this is impossible, as is frequently the case, direct treatment of such a brain lesion is out of the question. The manner of treatment is of importance in only a minority of cases, since many subjects of intracranial injury are fated to succumb whatever measures are adopted for their relief. The result in the remaining cases will often directly depend upon the assiduity or discretion of the surgeon. In the majority of cases in which the issue is determined by treatment, it is met in the initial stage and by insuring restoration from shock. At a later period the question of operation may require for its determination the exercise of the highest surgical discretion and diagnostic discrimination. Only two conditions indicate operative interference: First, the removal of foreign bodies embedded in the brain; second, to prevent septic infection, or at least cut it short during its early stages. Both of these indications may exist at the same time. Regarding the first indication, the removal of a foreign body, the proof of such a condition may be very easy, very difficult or impossible. The diagnosis is difficult and frequently impossible when the presence of a foreign body in the brain can only be determined by disturbances in the brain functions. No matter how the diagnosis has been made, whether by direct inspection and palpation of the cranial wound, whether by deduction from the functional disturbances of the central organ, the clinical history or by means of the *x*-ray, the ideal treatment consists in the removal of the foreign body from the brain. A second indication which may lead to an operation in wounds of the brain is the contamination of the wound with infectious material carried from the outside by the foreign body. The removal of splinters, cleansing of the vicinity of the wound, removal of blood clots and brain fragments, trimming the lacerated and contused edges, carefully stopping of hemorrhages and drying the entire wound

and finally packing with iodoform gauze are the measures necessary in such cases and the earlier carried out, the more certainly do they promise the process of repair will go on smoothly and simply. Medical treatment consists of absolute rest in bed, icepack to the head, sedatives, thorough alimentation, elevation of the head and restriction of liquid diet.

I have a case to report, of interest only on account of the extent of the fracture, laceration of the artery, extent of the hemorrhage and the speedy recovery.

Mr. C. H., aged 31, while engaged in coupling the air on two large passenger coaches on the A. E. & C. R. R., had his head caught and crushed between the bumpers. The force was applied in the biparietal region and the skull was crushed necessarily from side to side. Blood gushed in a stream from the mouth and nose and there was a constant hemorrhage from the right ear. Dr. Vanderhoof, of Wheaton, was called and had the patient removed to a hospital in Aurora, where he arrived in about one hour after the accident. On inspection there was marked deformity of the left side of the head and on palpation the edge of the fracture could be easily mapped out. There was no injury to the soft structure, it being a simple depressed fracture.

On the right side near the parietal eminence there was marked depression and detached fragments could be easily felt. We had on this side a simple depressed comminuted fracture. The entire scalp was shaved and thoroughly disinfected and an incision was made over the site of deformity on the left side down to the bone, revealing a fracture extending from one inch above and posterior to the external angular process backward in a straight line for a distance of three and a half inches. There was fully one-half inch depression. The trephine was brought into play and a small button of bone removed and the depressed fragment elevated. There was no injury to the membranes or artery on this side and the wound was closed. On the right side an incision was made extending from the parietal eminence downward and forward, revealing a fracture extending from the above named point downward and forward to the base of the skull and then inward for a considerable distance. How far inward it was impossible to determine. The depressed area was about two inches wide at the upper part and from one-half to three-quarters of an inch at its lower part. Numerous detached fragments were present, and these and all depressed splinters were removed. The dura was torn for a considerable distance and the middle meningeal artery punctured or lacerated. The tear in the dura was carefully united with fine catgut sutures. The artery ligated, all blood clots removed and the wound dried thoroughly and packed with iodoform gauze. The scalp was sutured over the greater part of the injury, an opening being left near the lower point for drainage. A surgical dressing was applied and the patient placed in bed with the head elevated. The recovery was complete and uneventful and the patient left the hospital at the end of the third week, apparently none the worse for his experience, and has had no unfavorable symptoms since that time, which is a little over two years.

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DISCUSSION ON THE PAPERS OF DRS. M'DONALD AND TARNOWSKY.

Dr. Daniel N. Eisendrath, Chicago:—These two papers have been so carefully prepared that it would seem as though there was little left to say on this subject, but, after observing a great many cases of injuries of the skull which we have had at the Cook County Hospital, Chicago, there is one thing that has impressed

me, and it is something which does not seem to be clear in the minds of a great many practitioners, especially those who are engaged in general practice, and that is there is a condition of laceration or contusion of the brain that we must separate completely, both in our diagnosis and prognosis, from concussion and from compression. We may have cases of contusion or laceration of the brain without any of the accompanying symptoms of head injury such as we usually find in compression and concussion. These cases present themselves shortly after the injury, perhaps without any of these symptoms of unconsciousness or of any of the other focal symptoms except a focal disturbance, such as would be ordinarily due to pressure upon some cortical area of the brain. For instance, an aphasia, or a condition known as para-aphasia, is well illustrated in a case I operated on day before yesterday. The other focal symptom is a hemiplegia or a monoplegia. We do not seem to be conscious of this in our diagnoses of these brain cases, and when we have these cases of brain injury we think every case must be accompanied by symptoms immediately after the injury of the severe type. In order to show the value of what I have said, the case which I am about to report illustrates it very well.

A boy was hurt two weeks ago by having a hammer, which was playfully thrown into the air, fall, striking him in the left parietal region. It struck him close to the fronto-parietal suture, causing a small scalp wound. The boy paid very little or no attention to it, continued at his work for three days, at the end of which time he consulted a physician on account of increasing pain in the head. This pain was constantly getting worse and worse. The boy manifested symptoms such as were clearly brought out in the paper of Dr. Tarnowsky, that is, whenever you have temperature following injury of the brain it is well to suspect some intracranial mischief. This boy began to have a temperature of 102-4 and chills. I saw him for the first time on Monday morning. He was brought into the hospital in a delirious condition; his temperature was 102 and his pulse was 100, but which went as low as 80. The only focal symptom he showed was the condition known as para-aphasia, which is neither a motor aphasia nor a sensory aphasia. He could recognize objects indistinctly, and his mind would wander about other things which would have no relation to the subject we were speaking about. It was not an ordinary delirium.

After the scalp was carefully prepared, we cut down upon the skull and found the scalp wound infected. There was really no injury of the skull itself, except a shaving off of the outer table—a slight contusion. I debated the question as to whether we were justified in trephining, but, considering the gravity of the symptoms, we trephined and found an area of extensive contusion on the posterior portion of the frontal convolutions, and upon inserting an exploring needle we withdrew a tablespoonful of typical pus. This showed the importance of recognizing these contusions in cases when there is no injury to the skull.

Dr. Thomas J. Sullivan, Chicago:—Just a few words in regard to these skull injuries, as we will not have time to discuss these excellent papers at length, and, first, in regard to closing the port of entry in these injuries. In all injuries where there is a slight abrasion, no one is justified in allowing it to pass without thorough shaving, disinfecting and closing the wound with some occlusive dressing. In many of these injuries, where there is an escape of fluid from the ear, and where other symptoms do not warrant immediate operative interference, even after days, thorough attention to the ear is essential. The ear should be thoroughly washed with soap and water for a considerable time, and after that with alcohol, and then, for instance, in children, where there is an escape of serum, it can be completely stopped and an occlusive dressing made by packing the ear with iodoform gauze saturated with compound tincture of benzoin. This will prevent the escape of serum and make an antiseptic occlusive dressing, cutting off the port of entry of infection. The nasopharynx is best disposed of, where the nasal bones are fractured, by continuous irrigation of some soft, non-toxic antiseptic dressing, which will save the patient from the dangers of infection a little later on. These things considered will often protect a patient from an

infection, and later you can carry him through with or without operative interference minus the infection, and that is an important thing.

Dr. S. C. Stremmel, Macomb:—I want to endorse the statements of the last speaker very heartily. They are right. There is one criticism I wish to make on Dr. MacDonald's paper, and that is the application of ice in these cases. I can not understand what he wants to use ice for. In the first place, the only possible excuse for using it would be to check hemorrhage, but it would do harm otherwise. It would interfere with the early reaction that takes place after the production of an injury anywhere, and that is the first process of inflammation, the migration, the exudation that takes place there should not be interfered with, because it interferes with repair afterward. In the more serious injuries it is different, but in the milder injuries that process should not be interfered with. It is a protective and a reparative process, and when interfered with early it causes injury.

Dr. H. C. Fairbrother, East St. Louis:—I wish to say a word or two in regard to Dr. Tarnowsky's paper. One can not draw definite conclusions with regard to fracture of the base from the picture complex presented by him. The picture complex in a case of fracture of the base of the skull is variable. It is not the same in any two cases, depending upon the site of the fracture, the amount of hemorrhage and the crushing force producing the fracture, so that we have no definite picture of symptoms pointing to certain fractures of the base of the skull, and the only certainty of arriving at a conclusion is by postmortem examinations in fatal cases, and in this case, I understand, there was no such examination, and only a guess as to the point of fracture, if there was a fracture at all.

With regard to elevation and temperature being caused by hemorrhage and pressure, I would rather ascribe it to infection, especially if there is chill and elevation of temperature after severe head injuries. We usually refer it to infection, meningeal or cerebral. There is frequently, though, a great alteration in the temperature-pulse ratio and in the pulse-respiration ratio, as spoken of in this case. The slow pulse and a high temperature are common. In all brain lesions, whether from hemorrhage or shock, hemorrhage from fracture, or what not, there may be following the injury alteration in the temperature-pulse ratio, and especially in the respiration-pulse ratio.

With regard to operative procedures, in fracture of the skull attended with unconsciousness, certainly an exploratory operation is desirable, and, as there is great danger from the general shock and severe injury, an operation could hardly do any damage under such circumstances, and always, where there are any symptoms of depression whatever, or certain symptoms of pressure from hemorrhage, I believe immediate operation is demanded.

Dr. MacDonald (closing the discussion on his part):—Just a word or two in answer to Dr. Stremmel with regard to the application of ice to the head. I stated in my paper that an ice-cap may be used when indicated only, and then not applied to the site of the fracture, as it would delay repair.

A point which especially occurred to me is to delay operation until sufficient time has been taken to make a diagnosis. Of course, where there is compression or indications of hemorrhage, then an operation is called for, but to operate on a simple fracture more damage is done than was produced by the original injury. I only mentioned the ice-cap in those cases where it is indicated, and then not applied at the site of injury.

Dr. Tarnowsky (closing the discussion):—I am very glad my paper has elicited such a free discussion and also some condemnation.

Dr. Eisendrath has called our attention to the fact that it is always important to separate laceration of brain tissue from here contusion and concussion of brain tissue. That is why I advised having all such cases placed under the keenest observation for at least a period of one week, because in these cases of laceration of brain tissue, as Dr. Eisendrath has so clearly pointed out, we have a

comparatively free interval, with few or no symptoms, except some mild focal symptoms, but later on a rise in temperature indicative of severe cerebral laceration.

Regarding the care of the cavities which may communicate with the cerebrum in cases of fracture of the base, I would take exception to one statement, and that is packing the ear with iodoform gauze in order to prevent the escape of cerebrospinal fluid. I question whether it is advisable to prevent the escape of cerebrospinal fluid in these cases. It is important, of course, to prevent infection from traveling from without inward, but are we not relieving pressure by allowing the escape of cerebrospinal fluid, provided we prevent infection from without? It seems to me, by thoroughly cleansing the ear, making it as aseptic as possible, and then closing it with pledgets of sterile cotton, we prevent infection from without and at the same time we do not stop drainage.

The last speaker (Dr. Fairbrother) questioned the diagnosis of this case. I would like him to explain how we can have a palpable, demonstrable diastasis of the temporo-parietal articulation, which is practically a fracture—how we can have a complete paralysis of the facial nerve without a paralysis of the auditory nerve on the same side? Supposing we had had deafness and facial paralysis on the same side, we might ascribe it to pressure within the calvarium from a hemorrhage. It seems to me that where we have paralysis of one nerve which is in intimate connection with another nerve, and one escapes, while the other is involved, a diagnosis of fracture of the petrous portion of the temporal bone is no longer guess work. Then, too, where did the cerebrospinal fluid come from? I do not believe this was guess work. The case was passed on by other men besides myself, and I think the diagnosis of fracture of the base and a diagnosis of temporo-parietal diastasis were positive and not guess work.

SOME OBSERVATIONS ON OPHTHALMIA NEONATORUM.*

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The observations recorded in this paper are the result, for the most part, of personal experience in the management of a rather large number of cases of purulent conjunctivitis in the newly-born. The larger proportion have been observed during a term of service at the Illinois Charitable Eye and Ear Infirmary. Some of the cases have been private patients who have been cared for in their homes, and a few have been seen but once or twice in consultation with other oculists. Unfortunately, in many of the cases, seen previously to two years ago, complete records giving exact time from birth that the disease was first observed, the bacteriologic findings, the treatment employed, whether any prophylactic method had been instituted, the time required for a cure, etc., are not available. During the past two year period, and comprising a series of upwards of thirty cases, such data has been secured.

The results of my observations in the main do not materially differ from those of others, so far as I know, but the experience gained has tended to impress upon my mind certain practical points in the management of this class of cases, and I record them here for what they may be worth.

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* Read at the Fifty-eighth Annual Session of the Illinois State Medical Society, May 19-21, 1908.

In the first place, I desire to emphasize the value of Credé's method of prophylaxis. In the present day and age it would hardly seem necessary to suggest to the profession the undoubted efficacy of a procedure which, backed by statistics of incontestable accuracy, has been the means of saving so many infants' eyes from destruction. Yet the fact remains that quite a substantial proportion of medical practitioners do not employ it as routine. Two reasons are frequently assigned for the neglect—one of which is sentimental and the other the inconvenience of having always at hand freshly prepared and clear solutions of the silver. The first objection gained a foothold in the minds of medical men at a time when ophthalmia neonatorum and gonorrheal infection were considered classically inseparable. This latter, as is now quite generally known, is positively erroneous. The second objection should have no bearing in the mind of the conscientious physician.

The details of the toilette of the newly born infant must be left to some one more qualified to speak than myself. It is evident that immediately after birth the eyes should be cleansed with some bland solution previous to the instillation of the drops. That the instillation of a drop of silver solution in the eye of the new born babe will invariably prevent the disease is not borne out by clinical experience. In two of my cases—one of a decidedly virulent nature in which total destruction of vision of one eye resulted—did the prophylactic method fail to accomplish its object. Yet in the vast majority of instances where ophthalmia developed no prophylactic measures were instituted. In rare instances intrauterine ophthalmia is encountered. Such a case was met with by the writer and reported in detail in the *Journal of Ophthalmology and Oto-Laryngology,* April, 1907.

The action of the silver in the conjunctival sac is not so much germicidal as it is to render the conjunctiva a poor medium for the propagation of pathogenic micro-organisms. For this purpose, it seems to the writer that a strength of one-half of that recommended by Credé might be almost equally as efficacious and serve the purpose, and this strength is sufficiently unirritating to overcome any objection that might be urged on this account. In reality, however, I believe that the objections which have been urged against the use of silver in this connection on account of its irritating qualities are of little importance. The writer once had the opportunity of seeing an infant whose eyes, by instructions of an ignorant physician, had been freely irrigated with a 2 per cent. solution of silver nitrate regularly every two hours for a period of more than forty-eight hours, and still the baby recovered with reasonably clear corneæ. Cases of reported injury to the eyes by the silver prophylactic treatment have, in most instances, if not in all, been caused by the use of a stronger solution than that recommended by Credé.

The bacteriology of the disease is of interest and of much practical importance. The idea that ophthalmia neonatorum and gonorrheal ophthalmia are always one and the same does not by any means hold good in the light of modern thought and investigation. While the gonococcus

is present in a majority of cases, it is safe to say that in one case in every three its presence can not be demonstrated. This finding has been proven in the series quoted in this paper. The pneumococcus was the offending micro-organism in slightly more than 10 per cent. of the cases, the staphylococcus in about as many, and the Morax-Axenfeld diplobacillus, and the bacillus coli were demonstrated in the remainder in about equal numbers. The practical bearing of these figures gives prominence to certain facts, viz., that it is not necessary to have a gonorrheally infected vagina in order to have a case of ophthalmia neonatorum develop, hence the advisability and necessity of employing prophylactic methods in cases of labor, even where it is considered almost certain that the mother is not infected. Again, the nature and course of the disease when produced by certain micro-organisms differs so materially that it is of decided clinical value to the physician to be familiar with the particlar bacteria with which he has to deal. For instance, in true gonorrheal ophthalmia neonatorum, we may always look for a more severe and protracted course of disease than in pneumococcal, streptococcal or diplobacillary ophthalmia, and we should accordingly redouble our efforts in the case of the former to effect favorable results, and in the latter to modify our line of treatment as the bacteriologic finding would suggest. It is recognized, and the writer has observed it clinically, that the conjunctivitis produced by the staphylococcus albus is almost invariably milder than that in which the staphylococcus aureus is the etiologic micro-organism.

The clinical appearance of the disease other than that denoted by the degree of severity may differ somewhat, depending upon what micro-organism is the cause of the inflammation. For instance, I recall one case in which the skin of the lid margin at the outer angle of the eyes was reddened and excoriated as one sees it in the typical diplobacillary conjunctivitis of adults. In this case the ordinary treatment of ophthalmia neonatorum was supplanted by the use of zinc solutions with eminent satisfaction. Examination demonstrated diplobacilli associated with staphylococci.

Regarding the treatment of ophthalmia neonatorum, page upon page has been written. Silver nitrate has been the faithful remedial sheet-anchor in this disease since von Graefe employed and recommended it a half century ago. To-day, in the opinion of the writer, it stands without an equal and is the remedy *par excellence* upon which to depend. This opinion has been formed by personal experience; I am aware that it is at variance with that of many other observers.

Of the so-called modified silver preparations, argyrol, in the hands of the writer, has given the best results and its free use in a strength of 20 per cent. I consider a valuable adjunct to the classical silver nitrate treatment. Frequent and copious irrigations of the eyes with some sterile or weakly disinfectant solution is imperative in the intelligent treatment of the disease. In my experience irrigations are usually poorly and in-

effectually performed when soaked pledgets of cotton or even eye-droppers are employed for the purpose. The method I am in the habit of employing is to use a fountain syringe with a specially prepared glass tip made absolutely smooth, that may, if necessity demands, be introduced directly into the conjunctival sac. A large amount of the solution should be used, usually from one to two quarts at each irrigation. When the irrigation is done in the manner described it is practically certain that every particle and shred of mucus or pus is removed; by other methods this is by no means certain. The frequency of employing these copious irrigations depends naturally upon the amount of discharge and the general appearance of the diseased eye. In the average case it should be done three times a day. The solution employed may be permanganate of potash, 1 to 15,000, boric acid, or even sterile water. I am in the habit of using the former. The benefit derived comes not so much from the antiseptic value of the solution as from the mechanical cleansing. The infant is best held on its back by the nurse, the head on or between her knees, a piece of rubber sheeting or oil-cloth being used to protect the clothing.

When the lids are markedly swollen, rendering free irrigation difficult or impossible, the palpebral fissure should be widened by a free canthotomy. In every instance in which the writer has performed this little operation he has been rewarded by marked improvement in the ocular disease. The discharge must not be allowed to accumulate in the conjunctival sac, and it is little short of criminal to sit idly by, wasting precious time in such cases, when the mechanical interference to free drainage can be so readily and satisfactorily relieved.

Warm applications are to be preferred to cold. Their effect is to stimulate vascular and lymphatic circulation to the end of enabling the leucocytes to make a better fight against the pathogenic germs of the disease. Cold or iced pads recommended by most writers, and which I have employed myself in many cases, I have learned to discard. Their negative action on the circulation and their depressing effect on the cornea I believe more than counterbalances any good effect they may possess in lessening the virulence of the micro-organisms or in preventing their multiplication. The applications are best made by means of small squares of gauze which must be light in order not to interfere with drainage of the eye. For this reason anything in the nature of a poultice or dressing is positively contraindicated.

A point that must not be lost sight of in the management of ophthalmia neonatorum is that the corneal complication, when it occurs, is what destroys the sight; for this reason careful and frequent watch must be kept on this structure, and if haziness develops or an ulcer appears while the case is under treatment it is an indication that the mode of treatment is either illy chosen or that it is being ineffectually carried out. Treacher Collins says that a case of infantile ophthalmia when first seen should

be in its worst stage, and that it begins to improve immediately under treatment.

The physician who has a case of purulent conjunctivitis develop in one of his infantile patients, especially if he employed Credé's method of prophylaxis, is unforunate; yet if he recognizes the disease early and does not lose an hour in instituting intelligent treatment, he need have little fear of an unfavorable outcome of the disease. It is one of the most pitiable and cruel incidents of medical practice, and one destined to touch the sympathetic cords of the most hardened heart, to contemplate the conditions which too plainly present themselves in the case of neglected ophthalmia in the newborn infant. Babies not yet a month old, indeed, in some instances, not yet two weeks born, with corneæ perforated and suppurating, eyelids frightfully swollen and red, thick creamy pus oozing through palpebral appertures of such minute proportions as to be of practically no service in ridding the eye of its effete contents, the infant destined to go through life, should he be so unfortunate as to endure, groping his way in hopeless darkness, such is the picture to which I allude. And such a picture is by no means rare or overdrawn. I have seen it many more times than once. Can the canvas be spared such a besmirching and the victim a life of endless gloom? In many instances—aye, in a vast majority of instances—yes.

Let us begin our treatment with a more general adoption of the silver prophylaxis method of Credé. Let us appreciate the fact that ophthalmia neonatorum is not always of gonorrheal origin, and that the demonstration of a prophylactic measure is no perverse reflection upon any member of the family in which it is employed. Let us not only look with suspicion upon the reddened eye of the new-born child, but let us lose no time in instituting vigorous, intelligent and painstaking treatment. If the disease increases in severity under our management, let us not waste precious time in unnecessary delay until the little one's eyes are beyond hope of reparation, but let us recognize the imperative necessity of consultation and act upon its suggestion. By acting early, intelligently and conscientiously in the conduct of our infantile charges, we will do much toward reducing the now too large proportion of blindness due to this disease.

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DISCUSSION.

DR. JESSE P. SIMPSON, of Palmer: Dr. Nance drew a graphic picture of gonorrheal ophthalmia neonatorum. I wonder if the picture would not be much more sad were we to add measles as a further affliction. It was my experience to have such a case. Had directed the instillation of a 2 per cent. silver nitrate solution into the eyes once per day, in addition to the frequent use of a milder collyrium, when after about a week both mother and infant developed measles. Then, even under the nitrate treatment, the chemosis became greater, and pus formation increased. We then began using the silver nitrate both morning and evening, and by that means saved both eyes of the child. That was before the days of argyrol.

HOSPITAL CONSTRUCTION.*

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In all parts of the country new hospitals are being constructed in great numbers. It is important that the money expended for this purpose should result in suitable structures for the care of the sick, containing the greatest possible amount of proper facilities for the money expended. It is of equal importance to have these buildings so planned that the greatest number of patients can receive the best possible care for a given sum of money spent in the maintenance of the hospital after it has been constructed. The following important features will serve to secure these results:

The first element in economy can be obtained by the construction of a compact building. The second element lies in the central location of utilities, because of the reduction in labor required in conducting the institution. The third element of economy can be secured by building many-storied hospitals. This feature should be discussed first, because it provides excellent facilities for developing the other two elements. In constructing any building one must look on the following parts as units of cost of construction:

The foundation and the basement represent one unit of cost; each story represents an additional unit, and the roof and garret represent one unit. This can readily be illustrated in the following manner: In constructing a six-story hospital the cost of construction represents one unit for the foundation, one for the roof and garret and one for each story, making eight units in all. In constructing six one-storied pavilions, on the other hand, each pavilion would represent one unit of cost for the basement, one unit for the first story and one for the roof and garret, making eighteen units of cost in all. In other words, the same facilities could be secured in the six-storied building at eight units of cost that would require eighteen units of cost were six one-storied pavilions constructed. This, however, is true only of hospitals in which each pavilion contains at least twenty beds.

The principal features which tend toward economy in hospital construction in the form of a many-storied pavilion extending north and south, with a central hall with rooms or wards arranged on either side, are the concentration of the conveniences in the middle portion of the building. The elevator, the nurses' service room and diet kitchen, the bath and toilet rooms are all located in the center of the building, where they are convenient, so that the distance the nurse must travel in going from each patient is reduced to a minimum, and, although these conveniences provide every facility, they occupy only a comparatively small portion of the building, leaving a very large percentage of space for the housing of the patients, which, of course, serves as a great economy.

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* Abstract of paper read before the Chicago Medical Society, June 10, 1908. Illustrated by stereopticon slides.

By superimposing these bath and service rooms the expense of installing the plumbing will be reduced to a minimum. It will be seen that the diet kitchen on each floor is directly underneath the general kitchen and special diet kitchen for the entire hospital. This makes it possible to serve all food, hot and palatable, at a very small expense of labor. The distance which the food must be carried from the general kitchen to the most distant floor does not exceed thirty feet.

The elevator can be so placed that all the noise from this source will be eliminated and each floor will be an absolutely independent unit, in no way disturbing the patients on the other floors. The hall in this building must, of course, extend from north to south in order to be exposed to the noonday sun, while every room and ward is exposed to the sun during one-half of the day. A slight deviation to the northeast or northwest is perfectly satisfactory with this form of construction. It may be well to compare these plans with another plan in which the hall extends from east to west and is placed along the north wall. This form of a pavilion has been frequently chosen because it gives every room a south exposure for sunlight. When one bears in mind the elevation of the sun during the forenoon and afternoon hours, as compared to the noon hours, it becomes plain at once that the total amount of sunning is far greater for all parts of a room facing either east or west than in a room in which the windows face south.

A comparison of these two types will show that in the building with the central hall the amount of utility is nearly double that in the other form when measured by the cost of construction. Moreover, the distance it is necessary for the nurses to travel, the amount of hall space to be kept clean, the number of windows to wash, the amount of outer wall area and roof to be kept in repair are all increased greatly in a building constructed on the general plan last described when measured by the amount of utility obtained.

The U-shaped building contains a great amount of utility for the cost of construction, and its concentrated form insures great convenience and at the same time conditions which will make its conduct most economical. Here, again, food can easily be delivered to the patients in all wards and rooms of the building, hot, palatable, wholesome, because the distance from the kitchen in the top story to the portion of the building farthest removed is relatively very slight. All provisions for carrying food a great distance after it leaves the kitchen are bad, whether this be done in heated carts or in any other way. The result is similar to a dinner which has been kept hot in the kitchen for some time after it is ready to serve.

It is best to place this building so that the parallel wings extend from northwest to southeast, because this insures sunlight for every window in the building during the entire year at the same time each day. It is proper, however, in case the location demands this, to have these wings extend from north to south, with open court facing south, because the end rooms along the north wall may be used largely for utility rooms, operating rooms, supply rooms and room with dark curtains for eye

patients, and the elevators must be placed on this side. Moreover, from March 21 to September 21 even this wall is exposed to sunlight early in the morning and late in the afternoon.

If one considers only the three items of increase in expense of heating, cleaning and repairing, one must conclude that from the standpoint of economy in running expenses the many-storied pavilion plan is greatly to be preferred to the one or two-storied pavilion plan. This would, of course, not apply to hospitals in the tropics, but it would apply to those constructed in almost all parts of the United States and Canada. Economy of construction would, of course, not be permissible were the resulting structure inferior in its quality of care to the patients. As a matter of fact, quite the opposite is the case. The patients can be perfectly free from danger from fire. They can be readily isolated from noises. They are near the head nurse and the floor nurses. They are near the service and bath rooms. They are near the kitchen and still entirely away from the odors of cooking. Heating, lighting and ventilation can be arranged in an ideal manner. It is possible to place such a building at a considerable distance back from the street and to screen it from the latter by planting shrubbery along the edges of the grounds.

It has been repeatedly demonstrated that the higher floors of any building contain less street dust and consequently a relatively smaller number of micro-organisms in the air than the lower floors. The same is true of flies; only rarely are these found in the higher stories of a building. If forced ventilation is employed it is possible to extend the air shaft intake above the roof of a many-storied building at a slight expense; hence, all of the air supply from this source can be obtained from an elevation which will insure relatively pure air. Moreover, natural ventilation, which must be generally employed in the summer months in every part of the United States, is always better higher up, because there is less obstruction from surrounding buildings. Another element of economy depends on the possibility to deliver heat in all parts of the building with very little loss on the way.

DISCUSSION ON THE PAPER OF DR. A. J. OCHSNER.

Dr. Carl O. Young:—This paper is too valuable and interesting to pass without discussion, especially in view of the fact that hospitals are being built in this city and vicinity, and those of us who have had personal experience in dealing with hospital architects have had to learn sad lessons with reference to the little thought they give to hospital construction, and we are indebted to Dr. Ochsner for calling our attention to this matter some time ago. I certainly have profited very much from a paper he wrote on this subject some years ago, and I am especially impressed with this form of hospital he has advanced, for the reason that the units of utility are brought close together, so that maintenance will be reduced to a minimum. It is good and well when we have other people's money to deal with and they will supply enough of it to build hospitals; yet when it comes to supplying the moneys ourselves, then as a practical matter we have to consider the cost of erection, and more especially the cost of maintenance. A hospital built on the plan thrown before us on the screen, with central hall, and wards off to each side, with the elevators and stairs as central as possible, especially bathrooms crowded away as shown in the chart, is the most practical form of hospital construction we can make use of in a city.

We get light, and we get one thing more that is very important, and that is, good ventilation. The air currents in these parts are mostly north and south, etc., and with a hospital built, so that the corridors run north and south and are open so that there is nothing to obstruct the current of air at either end, it helps to keep the hospital well ventilated. Further, it can be so arranged that the bathrooms will open in or the doors communicate with the wards from the bathrooms, so that a nurse will not need to go through the corridors with a bedpan, thus obviating the odors from fecal matter being carried through the corridors and spread throughout the hospital. This hospital, with a central hall in a north-south direction, will permit of good ventilation; it will be well lighted, and there will be as little hospital odor in such a place as can be.

Dr. S. C. Stremmel, of Macomb, Illinois:—I have built a hospital on the line Dr. Ochsner has suggested. It cost $17,500 to start with, and then an additional ten thousand dollars later, but it has all modern conveniences.

The suggestions given by Dr. Ochsner should be published in our medical journals, as there are a great many doctors all over the country who are building hospitals, and they do not know very much about their construction. They do not go into the detail of construction, and, as has been said, we learn by sad experience sometimes by not knowing about these things. This paper is timely and should be widely published.

Dr. D. A. K. Steele:—I have been much interested in seeing the views Dr. Ochsner has thrown on the screen. I am quite familiar with the contents of his previous paper on hospital construction. I have had some little experience in this regard, as I have put up three hospitals in Chicago, the last one, the University Hospital, having been completed and built on the lines laid down by Dr. Ochsner, showing a central hall, with rooms on either side of the wide hall. Ventilation is secured through a corridor ten feet in width, and the utilities provided for in the center of a five-story building, almost exactly as shown to us to-night. An essential thing in a modern hospital is to provide sufficient air space and conveniences at a minimum cost per bed, particularly for private hospitals, where we have to depend on the maintenance of the hospital from the fees received from patients, and where no donations are received. It is a curious thing, but nevertheless true, that the cost per bed in different hospitals in this city, that is, some of the larger hospitals, which receive their money from the public largely, is about three times as large as that of a hospital that is built by private individuals. They put in a great many extras or unnecessary things perhaps on the exterior of the building to make it architecturally beautiful, but do not in any way add to the facilities in caring for the sick in an economical and scientific manner. In building the University Hospital on the west side, we were guided entirely by the best method of giving air space, the best sunlight to patients in a thoroughly modern way in every part of the building, and the plans were already fully sketched out and the location of every room mapped out before we went to the architects. We did not ask the architects to draw us plans for this hospital, but simply asked them to make us working plans and from our sketches the hospital was built. The result was that we did not have to change a single door, a window, or room from the original drawings. And another thing that was very satisfactory is that we had no extras. We knew precisely what we wanted in the hospital, and therefore we were not confronted with the difficulty at the conclusion of the building of the hospital of finding that it cost about 25 or 30 per cent. more money than we started out with. That is a point that doctors who contemplate building hospitals should remember. It is essential to know the kind of building we want, and then you do not need to be guided by architects. But if as physicians we tell architects the kind of building that is necessary for the proper care of the sick, then we will get just what we want, and we will not pay for a lot of things we do not need in a hospital. In brief, my personal experience bears out the value of what Dr. Ochsner has said, regarding hospital construction.

Dr. A. Belcham Keyes:—I feel that in the construction of hospitals not enough attention is given to proper ventilation. The air current in the average closed room is caused by the motion of old air being heated and reheated by the radiator. Steam heat, as used in Europe, means pure air directly from the outside passing through the covered radiator; while steam heat in this country usually means reheating repeatedly a lot of old air. This is as true in hospitals as in private dwellings. I like the old hot air furnace, and am afraid of steam-heated places. Another of the points is the window, it is so heavy and often so difficult to raise that the airing is neglected; every hospital window should be arranged so that air can be easily let into a room in the quantity desired and with as little physical effort as possible on the part of the nurse or patient. Transoms above are often difficult to manage on account of the blinds and curtains being in the way.

This subject is a timely one, and we are greatly indebted to Dr. Ochsner for his contributions in the past, as I know we shall be in the future.

Dr. Fenton B. Turck:—I have been very much interested in Dr. Ochsner's remarks on the construction of hospitals, and particularly I would suggest the application of what is known as the roof garden idea. They are adopting this principle now in building hospitals. They have also adopted a method of filtering air and of protecting the filtered air from contamination. Of course, the value of open air treatment is well-known and the utilization of the roof garden principle in certain cases is valuable.

Along with ideas of construction of hospitals, measures for giving hydrotherapy and carrying out modern methods of dietetics are quite important to consider. We should likewise think of the advance that is being made in diet kitchens. Again, physical and mechanical therapeutics as now used should be borne in mind, with which Dr. Ochsner is undoubtedly familiar. These should be departments in our hospitals, but they are not always thought of, but I mention them in this connection as being worthy of consideration in hospital construction.

Dr. C. E. M. Fischer:—One part of a hospital, usually considered of small consequence and often entirely overlooked, is the laboratory. Laboratories are coming into more general use in hospitals, and yet in visiting the more modern institutions, one will find these laboratories so arranged that when he enters he has olfactory evidence that somebody has been working in there. In commercial laboratories, it is usually the rule to put them on the highest floor of the building, and then provide for good ventilation by means of hoods, etc. In hospitals, however, the general rule is to put the laboratories in some corner where there is all kinds of rubbish.

Because of the inadequate circulation of air in these places, one commonly finds an accumulation of smells from the bromin, the numerous samples of boiled urine and other odor-producing materials.

Undoubtedly no small part of the "characteristic hospital smell" is due to the fragrance of its pathological bouquets.

Dr. Ochsner (closing the discussion):—I am glad Dr. Fischer mentioned the item of laboratory in connection with the construction of hospitals, because it is a very important one. The way laboratories have been built in connection with previous hospitals has been this: You take the entire plan of the hospital, and then after everybody has taken what he wants, if there is any room left, the space is devoted to a laboratory. The laboratory should receive more consideration than it has in future hospital construction. Laboratories should be built on plans furnished by an experienced pathologist. The whole thing may be summed up in this way: The man who uses the laboratory should plan it, so that it is in keeping with the whole institution.

Dietetics are a very important matter. In every hospital of considerable size there should be a diet kitchen for the entire institution connected with a cooking school for the nurses. There should be a dietarian who should teach nurses how to make diets that a physician prescribes. The milk should be sterilized and modified for infants in this department. A diet for gastric ulcer cases should be

prepared here. Special diets for each and every class of cases should be prepared in the diet kitchen. This idea has been introduced and is being carried out in one of the hospitals in this city, and the economy of the plan is enormous. In the same hospital connected with the diet kitchen there is a bread-cutter, a butter-cutter and a toaster. These are utilized scientifically, and the saving per month over the expense of previous months was ninety dollars in the item of bread and butter for 300 persons. The result was very much better, to say nothing of the economy of this method. Instead of having barrels of bread sent away as wasted, there has been practically no bread sent away since. The same way with butter. I believe in the future we will have mechanical therapy rooms and rooms for instituting hydrotherapeutic measures in these hospitals, and these rooms will be built from the plans of those who know what they want.

As to filtering air, it is an easy matter to filter air by passing it through water and heating the water day after day. This plan was first introduced in building construction for the Royal Victoria Hospital, Glasgow, and worked very well, but the difficulty in its application is this: They have to heat an enormous amount of air, so that patients get fresh air. As has been suggested by Dr. Keyes, the error has been committed of forcing the air through coils of superheated steam. In the Presbyterian Hospital, New York, it was found that the superheated steam pipes had a temperature of 400°, so that the life was scorched out of the air that was delivered to the patients. That particular fault can be overcome in this way: You can pass air from the outside over hot water coils, regulated at 160° F., so that the air is not scorched. It is as fresh when delivered to patients as when it came in from the outside. The expense in heating air in such quantities is great. From the point of economy, it is possible only to heat a reasonable amount of air, which will suffice for mild weather, during the rest of the year the air in the rooms must be heated by radiators. If you give attention to steam heating, you will find this, that the steam coil must be 212° F., because unless it is heated to that extent there can be no live steam, and if there is no live steam, there is no heat. The matter of heating and ventilating, therefore, is the most difficult thing in the whole subject of hospital construction. In the heating of the Houses of Parliament in London, which was studied by the best men in England, they have spent many millions during the last thirty years, and now it is still practically unsatisfactory. You can see, therefore, how difficult it is for us to establish a method of heating which is correct.

PERFORATION OF UTERUS DURING CURETTAGE AND EXCISION OF FIFTEEN FEET AND A FEW INCHES OF INTESTINE, WITH RECOVERY.

SPECIMEN SHOWN.*

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Although this paper is not one on accidents during the operation of curettage, yet a warning of its danger will not be out of the way. This operation, that perhaps is looked upon by the majority of our profession as a very simple task, the only requirement being strict asepsis, yet, however, accidents are common, far more so than we imagine, such cases being seldom reported.

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*Read before the Chicago Medical Society.

A careful examination under an anesthetic is an absolute necessity, satisfying oneself as to the position and size of the uterus, whether free or adherent, also inspecting the cervix carefully. The writer was once mortified at splitting a cervix in its entire length while in the act of dilating. This accident might have been averted had he noticed its cicatricial condition. It is very doubtful if there is any gynecologist who has not had an accident while performing this extremely simple operation. Happily, perforation of the uterine wall with a clean blunt instrument, there being no pathogenic micro-organism in the vagina or uterus, is not such a serious procedure, from a mortality standpoint, providing there be very little bleeding.

Often these cases left to themselves get along famously, nevertheless very serious complications often follow perforation of the uterine wall, by dilators and curettes, this fact inducing J. W. Jarman in the *Gynecological Transactions,* Philadelphia, 1905, to urge that if in course of dilatation or curettage a rupture or perforation of the uterine walls takes place, it is better to perform a laporotomy and satisfy oneself that no untoward results will ensue. This stand is contrary to the general verdict, at the present time, but in these days of asepsis when abdominal exploration is a recognized means of diagnosis, and on the face of the figures of J. Jacob, of Munich, he may not be so far from right. J. Jacob wrote a thesis in 1905 on the danger of instrumental treatment of intrauterine disease, he collected 141 instances of perforation of the uterus, 23 of which died of septic peritonitis. Of these 141 injuries 73 were inflicted with the curette, 16 with dilator, 14 with forceps and 6 with catheters. It would be interesting to know how many of these fatal cases were operated at once. Jacob does not state. Coming near to the subject in view of this paper, Mr. Bland Sutton, in a clinical lecture delivered in the Middlesex Hospital, London, and reported in the *Lancet Clinic,* Feb. 19, 1908, describes a case very similar to those that Dr. Werelius, of Chicago, has reported and the author is about to do, as follows:

Some years ago a practitioner started to dilate and curette a young married woman for dysmenorrhea; when the cervical canal was sufficiently dilated to admit a finger, something soft was felt in the uterine cavity. Thinking the mass was fetal membranes, he diligently pulled on them until both hands were full; one end he cut through, the other he forcibly pulled away; on dropping the supposed membranes into a pail the doctor found to his horror the supposed membranes were intestines. Eight hours later I was called to the patient and found her nearly dead from the loss of blood. I performed celiotomy, removed a large quantity of blood from the belly, secured the hole in the uterus with a suture. I then found the cut end of the ileum and sutured it to the cecum, for the intestine had been torn away at the ileocecal junction. The abdominal cavity contained neither gas nor feces. A triangular piece of mesentery nearly two meters in length required excision and sutural union of the cut edges. The abdominal incision was closed with a single row of sutures and drained. Recovery. Mr. Bland Sutton does

not mention the amount of intestine removed, but, judging from the mesentery excised, it would probably be not more than eight to nine feet at the most.

Dr. Axel Werelius, of Chicago, in a paper read before the South West Branch of the Chicago Medical Society, February, 1907, and which afterward appeared in the *Journal of the American Medical Association*, March 16, 1907, reports a case of perforation, or rather perforations, of the uterus, for there were seven, with excision of 12 feet 2 inches of intestine, followed by complete recovery. He used a Murphy button, did not remove any mesentery, running a suture along its edge to control bleeding. His case ran a rapid course, the button being passed on the tenth day. In his case there was considerable hemorrhage into the abdominal cavity, the mesentery having been torn away from the intestine, but no fecal matter.

CASE 1.—On March 11 the author was sent for and arrived at Mrs. G.'s residence at 11:30 a. m. and found the patient, Mrs. G., a young married woman, aged 24, height 5 feet 5 inches, weight 136 pounds, well nourished and developed, lying on a bed, moaning as if in severe pain, face pale and anxious, pulse 120, and was given the following history by the doctor that was in charge of the case:

He stated that he had attempted to curette her on account of a persistent flow for three weeks; that he had found an easily dilated cervix and a uterus of four inches in depth; that he had merely placed a placental forceps inside and found a soft mass which he took for the cord and that he had pulled it a little; recognizing his mistake, he put on a vaginal pad and placed her in bed. He requested to be relieved of the case, as this unforeseen accident of such a magnitude had completely unnerved him. His request was granted.

A hypodermic injection of hyoscin gr. 1/250, morphin gr. ¼, cactin gr. 1/67, was administered and the patient ordered to be removed to the Lakeside Hospital. The patient arrived with pulse 100 and of good volume. Another hypodermic injection of hyoscin, morphin and cactin given half the former strength. She was placed on the table, prepared for both laparotomy and curettement and catheterized. On examination there lay on the table several feet of intestine, entirely denuded of mesentery. A laparotomy being the only resource available, it was immediately proceeded with by the author, assisted by Dr. R. H. Buck and Dr. J. T. Wood, the internes.

Operation.—The intestines, having been washed in bichlorid and alcohol, were wrapped up and an abdominal incision three inches in length was made in the median line two inches above the pubes and subsequently enlarged. The abdomen was opened, inspected and, to the surprise of all, there had been very little hemorrhage, the cavity sponged out, some clots and fecal matter removed, on manual examination a transverse tear on the anterior wall of the uterus, one inch from the fundus, was found and one coil of intestine protruding into the uterus, the other end having been torn off. The intestine was withdrawn into the abdominal cavity and wrapped up and laid aside. The uterus was now walled off and its anterior wall curetted. The tear was closed by catgut. The intestine was now inspected and found to be extremely devoid of mesentery for a distance of what afterward on measurement proved to be a few inches over 15 feet.

Search was made by following the mesentery around, and the ileum was found to have been torn three inches from its junction with the cecum. This was clamped. Pulse 100, firm and strong. On inspection of the mesentery there was absolutely no sign of bleeding, a few loose tags here and there, otherwise it was stripped clean. On cutting two of these tags they bled profusely and had to be tied, so it was decided to leave the mesentery alone. The intestine devoid of its mesentery was now cut off, one inch of intestine with mesentery was sacrificed at each end to get good union and a Murphy button selected to perform anastomosis.

The large size was decided on to obviate as much as possible postoperative stricture. The button having been locked, the mesentery was united for about five or six inches with catgut suture, the precaution of two silk sutures being taken. The patient was now placed in Fowler's position and two gallons of normal saline solution used to irrigate the abdomen. A drainage tube one inch in diameter was inserted with two strips of gauze inside and three strips outside. The wound was closed, peritoneum by continuous catgut suture, muscles and fascia by interrupted catgut and skin by horsehair and dressing applied.

The patient was now placed in the lithotomy position, parts rescrubbed, and the posterior wall of the uterus curetted, a strip of iodoform gauze inserted into the uterus, two into the vagina. Patient was removed to a private room. Pulse, 84, good; 3:30 p. m. patient awoke, skin dry and warm.

Postoperative treatment, day of operation: A continuous irrigation was ordered of hot normal saline per rectum for twenty-four hours. Nuclein, gr. xl, hypodermically, was given every eight hours to increase resistance, ordered to be catheterized every ten hours if necessary; 8 p. m., temperature, 100; pulse, 84; respiration, 32; skin warm and moist; pain constant, sharp and shooting. Bed raised eight inches at the head.

First day after operation: Morning.—Temperature, 100; pulse, 80; pain very severe; a high candle power electric light ordered to be used for fifteen minutes hourly; after first application pain relieved. Afternoon.—Temperature, 99 2/5; pulse, 78; patient feeling splendid; urinated; water in small quantities allowed. Case dressed clean. Requested her manicuring outfit to be brought down.

Second day after operation: Morning.—Temperature, 99 2/5; pulse, 68; patient restless; considerable emesis of a dark green nature; kidneys secreting nicely; some flatus passed in the evening. Case dressed clean and gauze strips loosened; serious discharge. Afternoon.—Temperature, 99 2/3; pulse, 70; patient spoke very highly of effect of light, saying it relieved her pain and made her feel stronger. Light applied for fifteen minutes at intervals over abdomen and back. Nurse reports light generally sends patient to sleep. Water *ad libitum;* slight watery dark brown bowel movement.

Third day after operation: Patient had severe abdominal pain in the morning for three hours, which combination enema, also light, failed to relieve. Hyoscyamin, gr. 1/500; nitroglycerin, gr. 1/250; strychnin arsenate, gr. 1/134, dissolved in water and repeated in half an hour. Fifteen minutes after second dose pain entirely relieved and patient went to sleep. Case clean. Pulse and temperature the same.

Fourth day after operation: Case dressed; serious discharge. Tube removed and gauze drains inserted; patient feels fine; bright and cheerful. Morning, temperature, 98 3/5; pulse, 80. Evening, temperature, 99 1/5; pulse, 80.

Fifth and sixth days: Case clean, slight discharge, bowel movement; kidneys acting well; flatus freely discharged; bright and cheerful.

Seventh day: Nutrient enema every four hours; patient bright and strong, but begins to show loss of weight. Temperature, maximum, 100; pulse rate, 100, not quite so good. Strych., gr. 1/30, every four hours; nuclein discontinued. The physiological symptoms of the nuclein being rise in pulse rate, 1 per cent. lysol douche ordered.

Ninth, tenth, eleventh days: Maximum temperature, 100; pulse, 104; case dressed daily; clean. Rise of pulse rate diagnosed as starvation; rare beef to be chewed every four hours; broth, milk.

Twelfth, thirteenth, fourteenth, fifteenth, sixteenth, seventeenth days: Uneventful. Slight pus showed up. Temperature, maximum, 99 3/5; minimum, 97; soapsuds enema daily; entire body massage with cocoa butter night and morning; patient sat up with back rest fourteenth day.

Eighteenth day: Patient weighed 111 pounds.

Nineteenth day: Out on porch. Button passed; no discharge.

Twentieth day: Patient up and around; weight, 113 pounds.

Twenty-fourth day: Patient went home.

About two weeks afterwards patient had severe diarrhea from eating lettuce; castor oil, one ounce; next day better. Patient has three or four movements daily. About one month afterward patient was in a very nervous condition from pain on bowel movement, described as tearing and burning; made her cry and dread the stool. Diagnosed as due to unabsorbed bile; recommended to anoint rectum with vaselin; applied on the finger; relief. At present time, three months after operation, the patient is in splendid health, two daily bowel movements; helps with the household duties. Her dietary consists of meat, bread, eggs and milk. Vegetables and fruits can not be eaten without causing diarrhea. She says she feels strong; she suffers no pain or inconvenience of any kind, except the fact that she is ravenously hungry all the time. Her stools are, as she puts it, like a child's. Weight, 129 pounds.

SUMMARY.

1. Before performing currettage make absolutely sure of the position of the uterus, whether free or adhesions exist, noting position carefully, especially as to the flexions; also inspect cervix.

2. Amount of intestine removed; although this is a few inches over fifteen feet, the patient at present is well nourished and apparently well: owing to the lessened extent of the intestine and the naturally lessened surface for absorption of food, her appetite is very large.

3. The slight amount of hemorrhage considering the magnitude of the injury.

4. Absence of shock; was this due to morphin being given within half an hour of injury? Probably yet. When seen the patient was in collapse; on arrival in the surgery her condition was good; twenty-four hours after operation splendid, as evidenced by all physical signs and the request for her manicuring outfit.

5. Great loss of weight, although the patient was allowed water from the second day, nutrient enema on the sixth and fed freely on the ninth.

6. If a similar case were to present itself the intestine would be removed per vaginam.

7. The anterior wall of the uterus was curretted through the abdominal wound to be sure of cleaning out the uretus and not tearing it again on currettement. The author, owing to circumstances, was absolutely sure there were no pathogenic germs in the uterine cavity, so thought he ran no risk of infection by adopting this course and knowing that complications would ensue if any fetal products were left in the uterus to decompose.

8. The rise of pulse rate about the tenth day was probably due to pus pocket found a few days later, but pus was very small in amount and starvation may have had something to do with it.

9. The use of a high candle-power light in preventing infection and relieving pain; although there was free fecal matter in the abdominal cavity, no peritonitis developed. The use of a high candle-power lamp seems to have very great pain-soothing qualities.

Sept. 11, 1908, patient in perfect health; five meals a day; weight, 135 pounds.

DISCUSSION ON THE PAPER OF DR. DAVIS.

Dr. A. P. Heineck:—The essayist, Dr. Davis, is to be congratulated upon the successful outcome of the case which he has reported to us this evening. I am, to a certain extent, conversant with the literature, which has appeared during the last ten years, on perforations of the uterus. In all intra-uterine maneuvers one must keep in mind that there are dangerous uteri, dangerous maneuvers and dangerous instruments. Dr. Werelius, of Chicago, reported last year in *The Journal A. M. A.* a case in which, in an attempt at criminal abortion, the uterus was perforated seven times and several visceral injuries inflicted. In that case Dr. Werelius resected 12 feet of intestines and repaired the rents in the uterus. His patient recovered. At the end of eight months she had gained thirty-one pounds in weight. She has since given birth to a normal healthy child. Labor was uncomplicated. Dr. Hessert, also of Chicago, reported in the *American Journal of Obstetrics*, 1905, a case in which the uterus was perforated by the blades of a Goodell dilator. This uterine perforation also was associated with grave visceral injuries. Dr. Hessert had to laparotomize his patient, resected four feet of intestine and sutured the uterine perforation. His patient recovered, subsequently became pregnant and went through a normal confinement. Numerous are the other similar cases that could be cited. From my literary and clinical study of the subject I have come to the following conclusions:

1. Spontaneous perforations of the uterus due to pre-existing pathologic conditions of this organ can and do occur.

2. Perforating wounds of the uterus, be they intraperitoneal or extraperitoneal (there have been twelve such cases reported during the last ten years), have a morbidity; have a mortality. This morbidity, this mortality, increases in direct ratio with the inexperience, the carelessness, the surgical ignorance and the surgical uncleanliness of the operator. The expert recognizes, at once, the making of a false passage and institutes proper treatment. High surgical skill may convert an apparently hopeless case into a recovery.

3. Dilatation of the cervical canal and instrumental curettage of the uterine cavity are, owing to their associated dangers, not office operations. During the performance of these two operations the operator may be confronted by accidents, the meeting of which requires the highest surgical skill.

4. Once the uterus is perforated, all further intra-uterine instrumentation must be suspended. If it be imperative that the contents of the uterine cavity be removed, this must be done either by digital curettage, or it may be done with a curette, while the uterus is being watched from above through a laparotomy incision.

5. A perforated uterus should never be swabbed or mopped with caustics or irritating antiseptics. It is needless, it is dangerous.

6. A perforated uterus should never be irrigated.

7. The treatment of perforating wounds of the uterus is determined largely by the following conditions:

A. The septicity or asepticity of the uterus and its contents.

B. The septicity or asepticity of the perforating instrument.

C. The presence or absence of coexisting vascular, omental or intestinal lesions.

D. The size of and the number of perforations. A piece of omentum may prolapse through a large rent. A coil of gut may become incarcerated or strangulated in a large perforation.

8. If the perforated wound has been inflicted upon a non-septic uterus during the course of an aseptic intra-uterine maneuver, in the absence of complicating abdominal lesions, recovery is the rule.

9. A. If the uterus be non-septic, if the perforating instrument be aseptic and it can also reasonably be assumed that there is an absence of omental, intestinal or important vascular injuries, the treatment to be followed is one of armed expectancy. The patient must be confined to bed and perfect rest enjoined for at least three days. Patient's pulse, temperature, feces and abdomen must be carefully watched. A wick of gauze may be inserted into the uterus, but it should

not be introduced much beyond the internal os. A suppurative peritonitis, circumscribed or diffuse, a suppurative pelvic cellulitis, signs of internal hemorrhage, etc., call for intervention.

B. In all cases in which there has been a prolapse of omentum or of intestine into the uterine cavity; in all cases in which associated injuries to the intestines or omentum coexist, or in which there are reasons to fear a significant internal hemorrhage, laparotomy is urgent.

C. Once the abdomen has been opened, proceed according to indications.

10. A healed perforation of the uterus apparently does not interfere with the normal development and normal termination of a subsequent pregnancy.

Dr. Carl O. Young:—I wish to congratulate Dr. Davis on the excellent result obtained in this case of perforation of the uterus. There are one or two things I could not quite understand, and one of them relates to a high incandescent light relieving pain. I may have misunderstood the Doctor in what he said, but I should say that the relief of pain was brought about more by the mental effect than by the incandescent light.

The point he made, that unabsorbed bile, being discharged over the skin around the anus, caused irritation, which was relieved by the application of vaselin, would seem rather strange to me, since in our gallstone operations we not infrequently have bile flow over the skin without causing any trouble. Most likely it was pancreatic juice in his case that caused the irritation and not bile.

Dr. Davis (closing the discussion):—As to the therapeutic action of vaselin it was only mechanical until the rectal mucous membrane had become accustomed to the bile. As to whether it was pancreatic juice or bile he did not consider it of sufficient importance to have the secretion analyzed, but if Dr. Young had ever taken a good dose of calomel he would probably appreciate the poor woman's suffering, be it bile or pancreatic juice. As to the light, he was quite prepared to hear the cry of suggestion. In these days of therapeutic nihilism, if anything was beneficial in the way of drugs or other therapy, barring surgery, one immediately heard the tiresome cry of suggestion—suggestion—suggestion. Well, it might be suggestion. If so, it is a very fine form of suggestion, a form that was appreciated by the patient even more than himself. How the light acted the author was not prepared to say, not being able to prove and preferring not to theorize.

The author has had three cases of peritonitis within the last six months that were typical cases where a bad prognosis might be given, and yet under the light and calcium sulphid, gr. i, exhibited hourly, these cases were normal within forty-eight hours as to pain, pulse rate and temperature around 100. One of these cases, a ruptured ectopic pregnancy, was afterward operated and contents evacuated, adhesions of a very dense character existing, walling off everything in a most satisfactory manner. In two cases of pus tubes the light relieved the pain every time applied.

The author has also noted that in every case of minor surgical injuries sustained by employés of two companies employed in consruction work (tunneling), he has absolutely had no infection or sign of infection in any of these cases, all treated by one-half hour daily under a lamp. The men all come in expressing fear of blood poisoning, as they express it, stating that under this class of injury they often get it. One other case is worth recording.

A motorman ran into a wagon used for removing the contents of privies. He came in in a horrible condition. His hand was all mashed up, necessitating the amputation of the first three fingers, leaving him practically no palm to speak of. Fecal matter, sticks and dirt were ground in between the muscles, leaving nothing but the thumb and little finger and the skin on the dorsal surface of the two first fingers intact. This was used to make a palmar flap extending up to the wrist.

Immediately a light was used for one hour, in conjunction with a 1 per cent. solution of lysol constant irrigation. He was then taken to the Lakeside Hospital and operated on the next day. The arm was swollen, with considerable

lymphangitis. A light was procured, and within twenty-four hours the swelling had disappeared (30 c.c. of antitetanic serum being administered as a precaution). He left the hospital in two weeks without any infection, the parts healing by first intention.

The author advises the trial of light in all cases of infection or, better still, cases where infection is feared, not leaving it too late and then condemning it. If it will not do anything else, it will relieve the pain. As to the kind of light, the author has especially avoided naming any particular machine and is satisfied with any electric light and reflector giving over 300 candle-power.

LUDWIG'S ANGINA: A REPORT OF FOUR CASES.*

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The first case of Ludwig's angina which came under my care occurred in 1903 in my service at the Cook County Hospital; it was in a man who had received a fracture of the lower jaw with perforation of the fragments externally and into the floor of the mouth; there was infection and following the characteristic submaxillary and sublingual swelling. Because of my lack of knowledge of the disease at the time, I did not attach the importance it deserved to the symptom complex, and because of this and because the man was removed from the hospital and lost track of and the outcome consequently not known, I have not included this in my report. My next case occurred in November of last year and the next in January, 1908, and it was because of the peculiarities of these and the various and contradictory views expressed in the rather limited literature on the subject that I began a thorough review of the literature and made some dissections to try and satisfy myself as to why infection in this locality should be so distinctly different from the same condition in other parts of the body, and discover the real cause of the extremely high mortality and the suddenness of the same. While engaged in this the excellent and exhaustive article of T. Turner Thomas of Philadelphia appeared in *Annals of Surgery* (February and March, 1908), which covers the ground so thoroughly and includes much more than I had done or probably could have done and gives such a demonstrated explanation and solution of the several points of previous variance and clears up so entirely the heretofore vague and poorly understood points, that I had no need for further effort along these lines. Because of the recentness and completeness of the article I will not go into details, but simply mention a few points which are, I think, of sufficient importance to warrant repetition and emphasis. I wish to say, in passing, that from my observations, both clinically and on the cadaver, I can corroborate the findings and deductions of Thomas.

There is nothing new in the condition under consideration, for while first described by Ludwig in 1836 as a disease entity, it was recognized by the ancients and is spoken of by them under a variety of names.

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* Read before the North Shore Branch of the Chicago Medical Society, June 10, 1908.

While it is probably a comparatively rare disease, it is not nearly so much so as the few reported cases would indicate (Thomas was able to collect only 106, including his own two)—a great many cases are undoubtedly not recognized and are classed as cervical or submixillary abscess and death assigned to "sepsis," "toxemia" or some other mistaken cause—or if the correct cause is given the *modus operandi* is not recognized. Death from cervical abscess or submaxilliary abscess should be a rarity and the probabilities are that the majority so reported are unrecognized Ludwig's anginas—this is due to the little attention which has been paid to the disease and to the anatomy of these parts and the lack of general knowledge regarding both—the majority I believe, like myself, having become familiar with them only after acquaintance instead of before, as we should with a disease which, though comparatively rare, is always a possibility in submaxillary infections (a comparatively common condition) and which has a mortality of 40 per cent., so far, under favorable circumstances. It was deemed of sufficient importance for the French Surgical Society to devote a number of entire meetings to its consideration in 1892.

Definition.—Any cellulitis of the submaxillary region, *extending into the floor of the mouth,* i. e., involving the sublingual region, is a Ludwig's angina. *Without the sublingual involvement it is not.* We may, however find a primary involvement of the sublingual region with or without subsequent submaxillary involvement. This is also a Ludwig's angina. The latter, however, are very rare.

The chief points of interest are, how does this extension take place, and having taken place, why the disastrous and sudden results? These two points can best be understood from a study of the anatomy of the parts involved. I have here dissections of this region of the neck, mouth and pharynx. Note first the position of the submaxillary gland, the large amount of cellular tissue around it, the close proximity of lymphatic glands, the extension of the submaxillary gland through the opening between the post border of the mylohyoid muscle and middle constrictor, over the posterior border of the former into the alveololingual sulcus—its anterior extremity nearly or quite in apposition with the posterior extremity of the sublingual gland, thereby carrying a bridge of the cellular tissue, the tissue by which these infections spread—from the neck to the mouth, also the U shape of the sublingual gland lying in the deep alveololingual sulcus with a large amount of the cellular tissue around it. Note also how completely the tongue fills the mouth and the fixed boundaries on all sides except posteriorly—roof of mouth above, jaws and teeth at the sides—mylohyoid muscle below; the relation of the base of the tongue with the attached epiglottis to the trachea and the effect thereon of crowding back the tongue by a deposit in front of it; also note the ridge formed by the attachment of the palato-glossus and stylo-glossus muscles to the base of the tongue and the close proximity of the larynx to a rapidly spreading cellulitis which has passed this ridge. You will note also that this opening above mentioned is the

only weak spot in the barrier between the connective tissue of the neck and submucous tissue of the mouth and pharynx. It is easy to understand, therefore, how a cellulitis beginning in the submaxillary region may travel along this bridge of connective tissue to the sublingual region, crowd the tongue back and thereby embarrass breathing, pass over the ridge at the post margin of the tongue (which, however, contains but little connective or submucous tissue, and hence progress here is slower), enter the pharynx and involve the larynx (less than two inches away), with the resulting disaster—edema of the larynx, or pneumonia, or both. The barrier formed by the ridge at the post attachment of the tongue and the lack of cellular tissue therein with the consequent resistance to spreading infection, explains why there is so great swelling in the sublingual region before there is pharyngeal or laryngeal involvement and the rapidity of the latter after the barrier is passed. As the floor of the mouth becomes involved the tongue is pushed upwards by the resulting swelling and the mouth is opened to give more room, if it can be opened, but usually the hard swelling at the angle of the jaw prevents this to any great extent, with the result that room is found in the direction of least resistance, i. e. posteriorly into the pharynx, thereby crowding the epiglottis down upon the glottis, and cutting off the air passages, causing the difficult breathing noted in the early stage of the disease and interfering with swallowing.

The same condition is true of the infection itself. After entering the mouth and involving the sublingual region, it also extends in the direction of least resistance, posteriorly over the already described ridge, where it suffers a temporary delay, into the pharynx and then rapidly to the larynx, less than two inches distant, with resulting edema and death. Most of the cases die in this way and practically every postmortem examination *thoroughly performed* has shown sufficient laryngeal involvement to warrant a diagnosis of edema of larynx. This course also explains those cases wherein a pneumonia has been the cause of death, and gives a reasonable and logical explanation of why death is due to respiratory involvement instead of a systemic toxemia, as has been held by some writers. Moreover, there is usually a surprising lack of constitutional symptoms, even with the most severe local symptoms. Most fatal cases die suddenly without sufficient constitutional symptoms to warrant the stand of a systemic toxemia and often before such a condition could develop.

The disease runs a course which may become grave or fatal in a few hours. Others may run a mild course for a longer or shorter time and then suddenly become grave, always from respiratory trouble. The usual case will die or get well within a period of about fourteen days. The temperature is low, 100-102, and pulse correspondingly low; both increase, however, with respiratory involvement, if the patient does not die too soon. A number of investigators have tried to isolate a particular infective agent as the cause of this disease, but without success. A variety of bacteria have been found, but streptococci or staphylococci, or

both, and probably present in all cases, the streptococci more frequently. The increased severity of the disease and the greater fatality over similar infections in other parts of the body are due, not to the kind of infection, but to the location and anatomy of the parts involved.

The source of the infection is a tonsillitis, ulcerated or carious tooth, ulcer of the mouth, or any infective area in the mouth; the infective material passes by the lymphatics to the lymphatic glands of the submaxillary region, involves the gland and the surrounding cellular tissues before a protecting wall of lymph can be formed, as is done in the ordinary lymphadenitis, and spreads by the path already outlined; and also to the posterior maxillary fossa, and may follow the cellular tissue around the blood vessels, passing through the fossa, to the pharyngeal wall, as happened in Case 3 of this report. In two of my cases the trouble followed a tonsillitis, in one it may have been a tonsillitis or from an ulceration about a molar tooth.

Symptoms.—The swelling comes rapidly in the submaxillary region, forcing the jaw forward and preventing opening of the mouth, followed shortly by swelling in the floor of the mouth of a U shape, more or less pain and sensitiveness, tongue crowded out of mouth if it can be opened, increased flow of saliva, difficult breathing and swallowing, poor articulation, increase of swelling which takes on a peculiar purplish hue and *board-like hardness, which does not pit on pressure,* dyspnea and death unless relief is obtained by spontaneous or surgical opening. The swelling may be very extensive, encircling the neck, between jaw and clavicle and even extending down the back. It may pass around the neck and involve the other side; one peculiarity of the disease is the apparent absence or scarcity of pus. I say apparent absence, because there is probably always pus present, but owing to its small quantity and the extensiveness and hardness of the swelling, absolutely masking the anatomy of the parts, we are unable to find it. When found, it is often only a few drops and is frequently located under the mylohyoid muscle; this is due probably to the properties of streptocci for the formation of serous exudate rather than pus—gas is sometimes found—gangrene is very frequent, due to the pressure of an increasing hard induration in a limited space, it usually involves the structures within the mouth or throat, where the pressure is greatest and is sometimes very extensive.

Diagnosis should never be difficult, as there is no disease with which this can be confused. The prognosis, under proper treatment early applied, should be much better than the past report of cases has shown. I do not believe that spontaneous resolution ever takes place, and cases so reported have probably had an undetected spontaneous opening. Without spontaneous or surgical opening the patient will die, and even with spontaneous opening or late surgical opening many will.

Treatment is purely surgical. Free incision in all submaxillary swellings due to infection before it involves the sublingual region will probably prevent this involvement in a great majority of cases. If such involvement has taken place the incision should be more free and blunt

dissection carried through the mylohyoid muscle to the mucous membrane of the floor of the mouth. Incision should be parallel to and below the border of the lower jaw and also over the point of greatest prominence if not included in first incision. Always use blunt dissection, as the infiltration is so great as to preclude any possibility of distinguishing the various structures. While pus is frequently found in the floor of the mouth and spontaneous openings usually occur internally, because of the decreased resistance in that direction, yet incisions in the floor of the mouth have not been satisfactory and should not be used unless in conjunction with the external incisions as above.

If breathing becomes sufficiently embarrassed tracheotomy should be performed, though it seems to have little effect, and death usually follows shortly if the condition has become serious enough to require this step.

Autopsies have shown, as already stated, pus with destruction of varying quantities of tissue and always involvement of the larynx or lungs, or both, but more especially has it shown that in this disease incision has not been sufficiently free or done early enough. This point cannot be sufficiently emphasized. It is the whole essence of successful treatment, and while it may seem extreme to one who has not seen these cases, failure to do so will cause disaster and the keenest regret.

There has been a great deal of discussion as to whether the name of Ludwig's angina should be retained and the disease given a definite place in literature or classified under some general heading as a form of some other disease. It would seem to me that the name fits the condition unusually well. It is a typical angina and fulfills better than conditions usually do the classical definition of an angina—a condition located within or between the mouth and lungs which interferes with respiration. It is certainly a disease entity and Ludwig was the first to so recognize it. I should say to retain the name by all means.

CASE 1.—Male, aged 62. I first saw him Nov. 2, 1907, in a cheap lodging house; he had then been sick for about a week with a sore throat. He had been a very heavy drinker for a great many years; "thought he had syphilis when a young man"—has always been healthy. On examination pharynx is considerably inflamed, but no swelling of the tonsil. Around the last three molar teeth on each side there is a great deal of inflammation. Temperature 100, pulse 88, respiration 18. Says he feels pretty good but has no appetite, hurts to swallow. Constipated. Given potassium iodid and salicylic acid—calomel to move bowels—boric acid, mouth wash.

Nov. 21: Feels about same, but less pain on swallowing. Jaw feels a little stiff and can not open mouth very wide, pharynx less inflamed, teeth more so, says he has been using a good deal of mercurial ointment on account of vermin, and with the look of the teeth, I was suspicious of mercurial poison. Temperature 99, pulse 82, respiration 20.

Nov. 22: Large swelling of both submaxillary regions which he first noticed about midnight, and have increased rapidly since then (11 a. m.). Can not open mouth wide enough to see throat—pus oozing from gums around molars on both sides—no swelling in floor of mouth. Swallows all right. Temperature 99½, pulse 90, respiration 22. Pus from gums shows streptococci and staphylococci, gums cleansed with peroxid, cauterized with pure carbolic, followed with alcohol. Incision recommended but refused to allow any "cutting."

Nov. 23: Swelling of submaxillary region increased, complains of considerable difficulty of swallowing and at times great difficulty in breathing, at which time he feels as if smothering; can not lie down on account of dyspnea; can open mouth only far enough to allow insertion of finger; semi-circular hard swelling (U-shape) in floor of mouth; can not see molar teeth. Temperature 100.3, pulse 110, respiration 26.

Nov. 24: Sublingual swelling more pronounced, tongue raised against roof of mouth; dyspnea and dysphagia extreme; can not talk so as to be understood; mind clear; operation refused by self and family. Temperature 100.5, pulse 130, respiration 32. Did not expect him to live through the day.

Nov. 25: About 5 p. m. yesterday suddenly felt relief of dyspnea, and was more comfortable during night. There is a discharge of saliva and some pus from mouth, but can not see where latter comes from, there has been probably a spontaneous opening into the mouth accounting for relief. Temperature 101, pulse 124, respiration 30. Pus shows streptococci and staphylococci, the former predominating. After considerable arguing, consent was given to open, which was done freely below border of lower jaw under cocain and blunt dissection with finger done in all directions and into floor of mouth, but no pus located. Large quantity of dark blood discharged. Had to discontinue on account of condition of patient, who became cyanotic and stopped breathing; tracheotomy done; large amount of bleeding from superficial veins; patient breathed through tube and felt considerable relief.

Nov. 26: Patient felt somewhat better in the morning, but in the afternoon began to have return of dyspnea. Temperature 101, pulse 120, respiration 34. Area of dullness over lower lobes of both lungs. From this time on he began to get worse. At times slightly delirious but mostly rational; had incontinence of both bowels and urine. Temperature gradually rose to 104.4, pulse varied from 120 to 160, respiration from 34 to 50 until December 4, when he became cyanotic and died suddenly about 11 p. m. No autopsy permitted.

This case shows distinctly the several progressive steps in the disease if not aborted by radical measures; and also shows a systemic intoxication, which has, however, in a sense, secondary—the spontaneous opening which undoubtedly occurred prolonged his life or he would have died before any systemic symptoms had developed—and I believe that had he permitted free incision of the affected areas when first advised he would have recovered.

Case 2.—Male, aged 36. Strong, healthy man; family and personal history negative; does not drink or smoke, never has. Called to see him, January 8, on account of sore throat which he had had for about five days. Found tonsillar abscess which was opened freely, and second day thereafter felt all right and returned to work. On the morning of January 24, I was again called to see him on account of a swelling in submaxillary region on right side which had developed during the night of the 22d, and had increased very rapidly during the past night. It extends from parotid region to mid-line of neck and from lower jaw nearly to clavicle. Is hard as a board, of purplish color, not sensitive to touch, mouth can be opened enough to admit little finger which causes considerable pain. There is a considerable sublingual swelling extending in semi-circle (U-shape) around floor of mouth. This is also hard. Tongue pressed against roof of mouth. Breathing is slightly labored, complaining of slight difficulty in swallowing; can not articulate so as to be understood. Temperature 99.8, puse 96, respiration 33. Under light gas anesthesia, given through nose, an incision was made from angle of jaw about one-half inch below margin of lower jaw to mid-line of neck and blunt dissection carried down to the mucous membrane of the floor of the mouth. No pus found. Another incision about three inches in length was made over the outer border of the streno mastoid midway between the angle of jaw and sternum because of the prominence of the

swelling there and I thought, or rather I knew, pus was there. Free blunt dissection was made in all directions, but no pus found; there was, however, very free hemorrhage of very dark blood. There was almost immediate relief and the convalescence was uninterrupted. The opening of these conditions is a more difficult matter than we would suppose, as on account of the dense extensive induration one can not differentiate the structures and extreme care is essential. Blunt dissection should always be used.

This case shows the suddenness with which the disease may appear and become serious, the sublingual swelling following the submaxillary so rapidly as to make it dfficult to say which appeared first, and also the rapidity with which early and thoroughly opening will lead to a recovery, and it must be both early and thorough—either one is not enough. Had an expectant or palliative plan of treatment been followed this man would very probably have died suddenly from edema of the larynx.

CASE 3.—Male, aged 45; fairly stout; height, 6 feet; weight, 190 pounds. Pneumonia six years ago. Diabetes mellitis discovered four years ago. Passed life insurance one and one-half years ago. First seen with present trouble Feb. 24, 1908. Was taken sick on evening of February 20, with cold and sore throat, but went to his business on 21st, since which time he has been at home. Wife says he had high fever Friday night and Saturday. Soreness began on outside of neck on right side, back of mastoid process; this disappeared and soreness then began in throat on right side which swelled rapidly. When I first saw him, temperature was 101, pulse 100, respiration 20, both tonsils swollen, left only slightly, right very much; whole pharyngeal wall inflamed. Right tonsil opened in three places. Small amount of pus and considerable dark blood. Recovery was rapid and on the 28th felt particularly well. On the night of March 1, felt all right and sat up till about 1 a. m. Went to bed feeling O K. but shortly after began to have pain in outside of neck on right side and was awake all night with it. It still continues. Temperature 101, pulse 98. Very nervous and restless; ice bag applied. March 2 had a bad night; neck red and swollen on outside extending from mastoid process to clavicle and nearly to acromion and from middle line in front to mid-line in back. Swelling has a boggy feeling and is quite tender over point just below lobe of ear. Complains of constant pain; no swelling in floor of mouth. Swelling opened under local anesthesia along anterior border of sternomastoid over most likely point for about two and one-half inches and blunt dissection carried in all directions to a finger's depth. No pus but large quantities of almost black blood. Ice reapplied. Temperature 101, pulse 110. Felt considerably relieved afterwards. Throat O K, no swelling or bulging of tonsil. In the afternoon feels a little easier but getting very nervous. Can not open mouth to more than one-half usual limit. Finger detects a U-shaped induration in floor of mouth.

March 3, Morning: Very bad night, had great deal of pain, extremely nervous, refused ice but derived some relief from hot salt bags. Neck more swollen, of purplish hue and hard and board-like, still discharging blood; neck measures about 22 inches. (Usually wears a 17 collar.) Temperature 99½, pulse 98. Hot boric compresses applied to neck, changed every twenty minutes; appetite good. Tongue heavily coated with thick white coat. Breath foul, bowels O K; urine scanty and highly colored; specific gravity, 1032; sugar, 5 per cent.; no acetone. Afternoon: Temperature 100½, pulse 120; otherwise no change except more restless and nervous. Given H. M. C. tablet and strychnin 1.30 hypodermically.

March 3, Morning: Had a good night under opiate; feels better; local condition unchanged. Sterilized hot flaxseed poultice applied every half hour. Complains of severe headache and excruciating pain shooting up over the right eye and down to shoulder. Good bowel movement from cascara. Urine same as yesterday.

March 5, Morning: Slept well under opiate; breathing rather heavy and at times labored. Temperature, morning, 99, afternoon, 101; pulse 95 and 135; respiration 28 and 30. Neck same, mouth same; extremely nervous. Appetite good; losing considerable flesh and begins to feel weak, but is up and about the house; will not stay in bed.

March 7: Opened wound and probed in all directions. No pus but much dark blood. Voice thick. When asleep has smothering attacks and can not get breath; awakens with a start and feels weak and exhausted; once turned blue. Can open mouth enough to permit of examination of throat although it is difficult to force root of tongue, which is crowded up and back out of the way. Right tonsil and posterior pharyngeal wall red and swollen; both lanced; only dark blood at the time, but later small amounts of pus from pharyngeal opening (this, owing to the patient jumping, was not as thorough as it should have been). Felt better afterwards but breathing still bad. Temperature 99-100½, pulse 90-110, respiration regular and sometimes labored. Tongue covered with a nasty, brownish, thick coat; breath very foul; is troubled with large quantities of saliva and much thick mucus in the throat.

March 8: Better except for breathing, which is worse. Chokes when swallowing. Given morphin ⅛ grain, atropin 1/100, strych. sulphate 1/30 at night.

March 9: Breathing during night very bad. Swallowing difficult, otherwise no change.

March 10: Throat draining, swelling a little less and edges softening a little. Breathing bad, feels weaker, complains of throbbing in head, mostly right temple; relieved by pressure on left corotid artery probably due to embarrassed return flow on right side from pressure of swelling; this is also probably accountable, by pressure on pneumogastric, for irregularity in breathing but not for embarrassed respiration. Temperature 99-101, pulse 100-120; given 15 grains bromids with 2 grains of valerian, every two hours during day and 20 grains bromids and 10 grains chlorotome at 8 and 9:30 p. m., instead of hypodermic on account of breathing.

March 11: Feels better, throat discharging freely, voice thick, enormous amounts of mucus in throat; appetite gone. Has been on anti-starch diet since March 7. Urine shows 5 per cent. sugar and trace of acetone. Given citrate of iron 3i, citrate of potassium grains xl, aqua ℥viii, two teaspoonsful every two hours through tube; also sulphonal and chlorotome āā 10 grains, strychnin sulphate 1/40. Repeat in two hours if needed.

March 13: Breathing worse. Temperature 99.4, pulse 100-124. Right shoulder emaciated and droops; losing weight rapidly; has been slightly irrational a few times; great difficulty in swallowing; food catches and causes choking. Pharyngeal opening closed and swollen; opened. Urine: Specific gravity, 1.036; quantity, 18 fluidounces; sugar, 5 per cent.; acetone, trace; very weak but still about house; will not lie down.

March 15: About same. While I felt positive that the local conditions needed surgical attention and free opening and drainage, I did not dare submit him to an anesthetic or to the shock of operation without an anesthetic on account of the urinary findings. Called Dr. Hoelscher and Dr. Young in consultation. Advised continuance of treatment, more liberal diet, giving some starches.

March 16: Began to use a 500 c.p. therapeutic electric light on the swelling—ten and twenty minute applications as often as pain in neck is especially troublesome. From the 15th to the 24th, improved considerably except the breathing and throbbing in head. The light relieves pain in neck almost completely and since its use swelling has softened and gone down 50 per cent. Is not sleeping well at night and gets nervous and restless; given codein ½ grain, strychnin 1/40 grain and repeat in one hour if needed, and again in night if needed. These seem to work better than anything else. Breath very foul. Acetone has increased very considerably. Given soda bicarbonate 3ii, calcium carbonate xx grains, every two hours.

March 24: Has felt nervous, but otherwise better until 3 p. m., when he went all to pieces; had nervous chill, cried. Temperature 104, pulse 130. Given cold bath 20 minutes, reducing temperature to 102; strychnin 1/30 grain hypodermic every three hours. Urine: Sugar, 3½ per cent.; acetone trace, quantity normal.

March 25: Feels much better in all ways and continued to improve. On March 27 and 28, had pain and soreness and some swelling (?) on left side, which disappeared under applications of the therapeutic light.

March 29: Complains of itching all over and in the afternoon broke out with a rash like hives on arms and body—and a well-developed purpura hemorrhagica on legs—eyelids and lips swollen. A diabetic purpura. Given bicarbonate of soda ½ oz. every three hours.

April 4: Has improved in every way, rash gone, strength returning rapidly. Has been going outdoors for ten days. Still difficult to swallow and will not eat solids and still has fullness and throbbing in head and in ears usually in late afternoon. Tongue heavily coated and breath foul; throat still discharging, neck very much reduced, still hard; calomel and podophyllin each 1/10 gr. four times a day; codein ½ gr. when needed; hemabaloids two teaspoonfuls three times a day.

April 5: Felt comfortable last night though a little more difficulty in swallowing. About 4:30 a. m. awoke from sound sleep with feeling as if throat was filling up and would choke to death; could scarcely get breath at all; became cyonatic. Outside of neck on both sides felt stiff. Right side of throat and pharynx as far down as could be seen edematous; multiple puncture over this area. Light to neck to relieve stiffness; internal swelling reduced rapidly and about 6 a. m. went to sleep and though breathing was somewhat irregular has been comfortable. Temperature at 4:30 a. m. 100.

April 6: Swelling about same, not softening externally or in mouth; urine 30 oz.; specific gravity, 1.010; sugar, trace; acetone, negative; odor less sweet, no frothing. About noon noticed a white spot on lower angle of scar (which has been healed for some time) has now become larger, about the size of a dime; opened, about 1 dram of pus obtained from cavity about one and one-half inches deep, after which says pain is less and movement freer than at any previous time. From this time on improvement was constant, though slow; there were one or two times when he seemed to get worse and swelling increased, but it was only passing. He was not able to be out to walk until May 4. The right shoulder was greatly emaciated, weak and drooping, but it now is rapidly coming back to normal. When first weighed after sickness, weighed 152 pounds, loss of 40 pounds. Is now back to 180. Urine has entirely cleared up; blood counts on the tenth day of sickness showed reds 4,500,000, whites 18,000; on the tewntieth day, reds 3,250,000, and whites 24,000.

This case is of extreme interest, owing to the peculiar combination of conditions and as showing the various phases of the disease, and we can, I think, make some useful deductions from it. Had his condition warranted it, thorough opening in the beginning would have prevented a long and tedious sickness from which the outcome was a matter of great doubt. The several successive steps in the disease are unusually well shown, the extensive submaxillary swelling, followed by sublingual involvements, and again by pharyngeal extention, the sudden edema of the pharynx. I believe that the external opening and the possible relief of pressure by the several extensive bleedings from it may have had an influence on the recovery, but the prime factor was the fortunate pharyngeal opening which located pus. This recovery was a matter of

unusual good fortune and I hope I will never again have a case with counter indications for surgical treatment. The pus in this case showed a mixture of streptococci and staphylococci. A point of considerable interest in this case is the effect of the swelling, through its pressure on the spinal accessory nerve, on the right shoulder and shows how great the tension of the swelling is.

CASE 4.—Since writing the foregoing another case has come under my care which, I think, is entitled to classification under this heading. While making a social call upon a friend on the evening of May 21 he complained of a severe toothache in second molar on left side, from which he had that day had the filling removed because of pain. On May 24 he sent for me hurriedly at midnight. He had that morning had a hole bored in tooth, which liberated some gas but no pus. Relief followed until 4 p. m., when pain returned, at which time he felt both with his tongue and found a hard swelling in the floor of the mouth; pain spread all over face and down neck. About 8 p. m. noticed swelling at angle of jaw and of face and chin, which has increased rapidly since. When I saw him he was scarcely recognizable. The left submaxillary region was swollen, not as extensively as usual, but as hard as stone. Mouth opened about 1 inch and could be neither opened wider or shut; jaw pushed forward, giving an expression of deformity to whole face; could only utter sounds, no words; rectal temperature, 99.8; pulse 86; respiration 36, but free. Aside from pain in side of face he felt very comfortable. There was a soft swelling on the outside of the gum on left side extending from post end of alveolar process past the middle line, and on the inside a hard V-shaped swelling under tongue. Both these swellings were opened freely; a large amount of pus come from former, nothing but blood from latter. Recovery was prompt.

This case is an example of a reverse condition of the former ones, the swelling beginning on the inside, the result of an abscessed tooth, the infection extending around the post extremity of the alveolar process into the sublingual region and thence anteriorly along the sublingual gland and posteriorly out through the bucco-pharyngeal opening, already described, into the submaxillary region secondarily. The opening and drainage occurred before the infection had passed the ridge at the posterior attachment of the tongue and consequently before pharyngeal or laryngeal involvement. It was because of the history being so explicit as to the path of the infection and the short time elapsed, that no external opening was made.

I have reported these cases in detail in order to emphasize the lack of constitutional symptoms and the early and severe involvement of the air passages: the former appearing in no instance until after a longer time than usually suffices to end the disease one way or the other; in other words, the longer the disease lasts the more chronic its course, the more probability of constitutional symptoms from a toxemia, but also the longer a patient lives the greater the chances of recovery. It seems but logical, therefore, to assert that death is due to respiratory involvement and the part played by the infective agent from a constitutional standpoint is but secondary.

103 State Street.

THE COMMONER INFLAMMATORY DISEASES OF THE EYE AND THEIR DIAGNOSIS.*

THOMAS A. WOODRUFF, M.D.
CHICAGO.

There are certain inflammatory affections of the eyeball that are not infrequently mistaken for one another, especially by those who are not brought in daily contact with them. An error made in diagnosis is not only likely to be of serious consequence to the organ affected, but is apt to prove humiliating to the physician or surgeon who first sees the case and does not at once institute the treatment that each demands. Under ordinary circumstances no great difficulty should be experienced in classifying these various affections and distinguishing between inflammations of the conjunctiva and iris and glaucoma, three conditions in which mistakes are of not uncommon occurrence. The treatment of each is so widely different that those remedies that are indicated in one are contraindicated in either of the others.

Speaking generally, these inflammations have characteristics which, to the casual observer, resemble one another so closely that the real disease is quite easily overlooked. It happens that the reddened appearance presented by the eyeball (due to the engorgement of otherwise invisible vessels on a background of the white sclera) is common to most inflammations of the eye. Not only in the superficial, but in the deep-seated ocular lesions as well, one or all the venous and arterial systems of the anterior segment of the globe become affected and more or less deeply tinge the otherwise whitish globe. Taking this clinical observation as a starting point and combining with it careful inspection of the eye itself, we may readily distinguish the various eye inflammations from one another and from affections non-inflammatory in character, by means of the following plan: 1. The eyeball is wholly or partially reddened without discomfort or other symptom. 2. The eyeball is reddened and uncomfortable, but without actual pain. 3. The eyeball is red and distinctly painful.

Taking these divisions up in the order outlined and referring briefly to the most important symptoms and characteristics of the various infections.

1. THE EYEBALL IS WHOLLY OR PARTIALLY REDDENED WITHOUT DISCOMFORT OR OTHER SYMPTOM.

Practically only one condition is included under this heading, viz., *subconjunctival hemorrhage,* which is not an inflammatory affection. There is no discharge from the eye and close inspection of it shows that the redness is localized as a deep red, smooth, uniform patch, obscuring the scleral vessels. Except in the recurrent type and in patients over 40 years of age (when Bright's disease, arteriosclerosis or organic heart lesions may be suspected) it is an innocent condition.

*Read before the Southern branch of the Chicago Medical Society.

2. THE EYEBALL IS REDDENED AND UNCOMFORTABLE, BUT THERE IS NO MARKED PAIN.

Under this head come: (1) Hyperemia of the conjunctiva. (2) Foreign bodies in the cornea and conjunctival sac. (3) Phlyctenules on the conjunctiva. (4) Acute and chronic conjunctivitis.

Of the various inflammations of the conjunctiva the *milder hyperemias* are largely the result of local conditions, such as errors of refraction and exposure to unhealthy surroundings, as wind, dust, smoke and impure atmosphere. These present no marked symptoms outside of itching, smarting, burning and foreign body sensations. The lining of the everted lids looks redder and rougher than normal. The redness eventually extends to the ocular conjunctiva, where the subconjunctival vessels, especially in the upper and lower cul-de-sacs, are enlarged. No secretion forms, except a little at the inner canthus, which occasionally glues the lid edges together in the morning. The more severe conjunctival inflammations, such as acute conjunctivitis, purulent conjunctivitis, etc., are due to an invasion of the mucous membrane by one or more of the mircro-organisms that infect it. In the secretions of the normal conjunctival sac a variety of micro-organisms are found. Although a number of these bacteria (cocci or bacilli) are non-pathogenic in character, both they and the pathogenic varieties are generally present. Almost all of them are capable of setting up an inflammation under favorable conditions. Just what constitutes this favorable condition it is not possible to say in every instance, but we do know that an abrasion or some irritation of the mucous membrane is the most favorable aid to microbic propagation and its pathological results.

In most forms of *acute conjunctivitis* a microscopical examination of the discharge makes a diagnosis comparatively easy. For instance, in the variety known as acute contagious conjunctivitis, more easily recognized under the more common term of "pink eye," the Koch-Weeks bacillus is found in the secretions, while the pneumococcus and the diplobacillus of Morax-Axenfeld and the gonococcus of Neiser is found in other varieties of conjunctival inflammations.

The various forms of conjunctivitis have signs and symptoms similar to one another, the character of which depend largely on the severity of the inflammation. Usually there is no distinct pain, but smarting, burning and foreign body sensation, with a mucous and mucopurulent or purulent discharge which is found on the lid edges and at the inner canthus in sufficient quantities to glue the lashes together so that they must be washed apart before the eyes can be opened after a night's sleep. The injection and swelling of the conjunctiva, and a loss of its transparency is well seen on everting the lids and inspecting the posterior aspect of the globe. The conjunctival vessels on the globe are in most cases enlarged, particularly at the junction of the lids and eyeball in the retrotarsal folds. The conjunctival vessels run loosely in the conjunctival tissues, so that they may always be differentiated from the deeper vessels by the fact that they can easily be moved to and fro with the membrane itself.

Acute contagious conjunctivitis, commonly known as "pink eye," is usually met with in the spring and fall months, when, probably set up by wind and infected dust, it is frequently epidemic. In about two days after infection the ocular conjunctiva becomes deeply injected, giving it a bright red appearance, the redness extending to the margin of the cornea; hence, the name "pink eye." The conjunctiva is swollen and presents a succulent appearance. Photophobia and lachrymation are a source of discomfort to the patient, and pain is sometimes present, but not as severe as in the deeper inflammations of the eyeball. Slight hemorrhages are sometimes present on the ocular conjunctiva. The discharge, which is mucopurulent in character, is usually quite ropy and accumulates in the form of flakes in the retrotarsal folds. The lids stick together in the morning, while dried secretion is found adhering to the margin of the lids and to the eye-lashes. Sometimes there is a slight chemosis present, in which case the nutrition of the cornea is liable to suffer and ulceration may take place, not only from pressure on the vessels in that region, but following infection from the discharge retained in the sulcus. This affection is usually at its height at the end of the third day. It is sometimes accompanied by rise of temperature and other constitutional disturbances. The symptoms gradually subside after a week or ten days, but recovery may not take place until the end of two or three weeks.

Purulent conjunctivitis. It is sometimes difficult to draw a sharp line between the severer forms of acute contagious conjunctivitis and simple purulent conjunctivitis. In the latter, however, the chemosis is greater, while the discharge is more profuse and more purulent in character. The lids also become hard, tense and greatly swollen; the cornea is more often infected and ulceration more frequently occurs. The inflammation permeates the deeper structures and the subconjunctival tissue is infiltrated with inflammatory exudates. In the more serious cases of purulent conjunctivitis the gonococcus of Neisser is usually found. This disease attacks particularly the new-born (ophthalmia neonatorum) and the adult (gonorrheal ophthalmia). In ophthalmia neonatorum the infection usually takes place after the passage of the child's head through the vagina, so that the symptoms almost invariably show themselves during the first three days after birth. If it occurs at a later period the infection is probably not gonorrheal, but comes from soiled fingers, cloths, towels, sponges, etc. One eye is commonly affected one or two days before the other, although in some cases it is possible, if preventative measures are taken early enough, to prevent infection of the second eye. In the majority of cases, and especially in the severer forms, the gonococcus of Neisser is found to be present in the discharge. There is usually a history of the mother having suffered from a leucorrhea for some time previous to the birth of the child, or of the husband having recently had gonorrhea or gleet. The redness and discharge, which is slight at first, quickly increases and the lids become shiny and swollen, so puffed out that the upper lid falls down and covers the margin of the lower lid. The palpebral skin shortly after becomes tense and hard and of a dusky red color, so that it is almost impossible to evert either lid.

The conjunctiva is very red and much swollen, presenting a velvety appearance from the enlargement of the papillæ. This congestion rapidly extends to the ocular conjunctiva, which becomes intensely red and edematous, overlapping the margin of the cornea, so that the latter appears at the bottom of a pit surrounded by a hard rim of infiltrated and edematous tissue. The discharge, at first slight and yellowish in color, is soon very profuse and of a cream-like consistency. It is secreted rapidly, accumulates in the cul-de-sac and flows from between the lids onto the cheek. In consequence of hemorrhage from the ruptured capillaries the discharge may assume a yellowish-green color from admixture with blood. The disease usually runs its course in about six weeks. The chief danger is to the eyesight. The disease may affect the cornea, the vitality of which is always lowered, partly by strangulation of the vascular supply induced by the intense edema of the conjunctiva and partly from direct infection. When this occurs the surface of the cornea becomes hazy, dull and lusterless. This condition is soon followed by the formation of one or more ulcers, which spread rapidly, followed by perforation of the cornea into the anterior chamber and the formation of a dense white scar as the opening heals. Fortunately, in these days of antiseptic surgery, there is less danger of the child's eyes becoming infected than formerly. Where a discharge is known to exist regularly daily cleansings of the vagina should always be insisted upon. After the birth of the child the lids should be wiped dry with a piece of sterilized gauze, the eyes should be carefully opened, and, with a sterilized medicine dropper, one drop of a 2 per cent. solution of nitrate of silver should be carefully dropped on the exposed cornea. This is the method of Credé, which, if carefully carried out, will greatly minimize the danger of infection. By this method Credé reduced the percentage of cases occurring in the Lœipsic Hospital from about 10 per cent. to 0.2 per cent.

Foreign bodies in the cornea or conjunctival sac are always to be suspected when the patient complains of constant scratching and a sensation of foreign body. The sac and cornea should be carefully scanned with a magnifying lens when those symptoms are present.

Phlyctenules of the conjunctiva are distinguished by the formation of small elevations or pimples on the conjunctiva. This is a disease of childhood and is frequently accompanied by an eczematous eruption behind the ear, on the face and at the corners of the mouth and nose. The child presents a strumous appearance. The phlyctenule consists of a small, solid, reddish elevation, made up of a collection of lymphoid cells beneath the epithelial layer of the conjunctiva. In a short time the epithelium becomes destroyed and ulcer forms. Fresh attacks frequently occur, new phlyctenules appearing on other portions of the conjunctiva before the first outbreak has disappeared. As a rule, the disease extends to the cornea, forming ulcers, the resulting scar from which is apt to interfere with vision. The patient suffers from intense photophobia and lachrymation. The child buries its head in the mother's lap or in a pillow and seeks dark corners of the room to get away from the light. The lids are tightly closed (blepharospasm) and any attempt to open them is met with decided resistance.

THE EYEBALL IS RED AND PAINFUL.

These symptoms are common to iritis, glaucoma, phlyctenules and ulcers of the cornea, scleritis and episcleritis.

In *iritis* the redness, beginning as a pinkish hue, is first confined to the corneal region of the ocular conjunctiva, although in a few days all the vessels of the globe are engorged and the eyeball assumes a dusky-red color. Pain, which is slight at first, soon becomes very severe and radiates over the brow and sometimes down the cheek. It is usually severe at night, keeping the patient awake. The eyeball becomes very tender and sensitive to the touch, probably due to the involvement of the ciliary body whose blood supply is intimately connected with that of the iris. There is also marked photophobia and a copious flow of tears. Discoloration, loss of luster and a swollen, muddy appearance of the iris surface are early manifestations of the inflammatory changes, a brown iris changes to yellow, while a blue iris takes on a greenish hue. The pupil is contracted and its usual reactions to light and accommodation are affected. This is due to a number of causes: The enlargement of the iris vessels; spasm of the sphincter of the iris; exudate into the substance of the iris; or, as usually happens when improperly treated, adhesions of the iris to the anterior capsule of the lens. Exudates are almost invariably present on the posterior and anterior surfaces and margins of the iris and are of glue-like consistency. This is what causes adhesions to form between the iris and lens (posterior synechiæ) and is the chief cause of blindness from iritis. The pupil is often bound down to the lens about its whole circumference (ring synechiæ, exclusion of the pupil) so that it becomes immovable; or adhesions takes place at various points along the pupillary margin, causing the pupil to contract and dilate irregularly when exposed alternately to deep shadow and strong illumination. This irregular dilation of the pupil is shown when a mydriatic is instilled into the eye. Eventually, the pupillary space may become covered with an exudate, and if this be dense, vision is very seriously impaired. This condition is known as occlusion of the pupil.

It not uncommonly happens that iritis is mistaken for conjunctivitis or vice versa, a mistake which may prove very serious, as it involves the eyesight of the patient. An error in diagnosis may be avoided by observing the following points of difference between these common forms of ocular inflammation:

IRITIS.	CONJUNCTIVITIS.
Pain.—Often severe; worse at night; felt in and above the eye.	Pain.—None, but some smarting, burning, and sensation of foreign body.
Redness.—Especially marked as a zone about the corneal margin.	Redness.—More general.
Pupil.—Contracted, sluggish or immobile; iris altered in color.	Pupil.—Pupils and iris not affected.
Vision.—Affected.	Vision.—Not affected.
Lids.—Non-adherent.	Lids.—Adherence of lids.
Discharge.—Watery.	Discharge.—Mucous or muco-purulent.
Photophobia.—Marked.	Photophobia.—None.

Phlyctenules of the cornea present symptoms very similar to those described under a similar condition of the conjunctiva, viz., intense photophobia, lachrymation, blepharospasm.

Ulcers of the cornea. The detection of corneal ulcer presents a few

difficulties if it is at all extensive, although small and superficial ulcerations are easily overlooked. If the reflection from a window be allowed to fall upon the affected cornea the image of the cross bars will appear broken or irregular. One of the surest means of detecting the presence of an ulcer is to allow a few drops of a 2 per cent. solution of potassium fluoresceid to flow over the surface of the cornea (fluorescein, gr. viii; liq. potassæ, ℥ss; aqua dest., ℥j). This solution renders the denuded portions of the cornea green or greenish-yellow and accurately maps out the limits of the scar. Corneal ulcers are usually due to the entrance into the corneal substance of some one of the micro-organisms productive of inflammatory conditions. The virulence of the infection depends upon the nature of the bacterium, whether it be the gonococcus, streptococcus, staphylococcus, pneumococcus or other germ. Opacities of the cornea invariably follow ulcers in this situation, the resulting scar materially affecting vision, the defective sight depending upon the situation and density of the cicatrix.

Glaucoma. This disease is essentially due to a damming or blocking of the drainage from the interior of the eye. The chief lymph stream secreted in the interior of the eye proceeds over the lens through the zonula of Zinn into the posterior chamber, past the margin of the iris, through the pupil into the anterior chamber, traverses the latter to reach the angle of the anterior chamber formed by the junction of the iris and sclera, passes through the loose tissue at this point and by diffusion and filtration is taken up by Schlemm's canal and from this canal into the external lymph channels.

Obstruction to the steady escape of the intraocular fluids at any point in this drainage system or any undue increase of the fluids themselves, may produce glaucoma. Probably the most important obstruction to the exosmosis is at the angle close to Schlemm's canal. In many excised eyeballs affected with glaucoma the periphery of the iris has been found adherent to the cornea so as to prevent the flow of the fluids in the canal of Schlemm.

Acute glaucoma, with which we have to deal, appears in inflammatory outbursts, attended by severe pain in and congestion and redness of the eyeball. Associated with these symptoms is temporary impairment of vision, usually the first symptom, the blurring lasting for a short time, then followed by the vision clearing again. It is also attended by loss of focussing power, and necessitates the frequent changing of glasses, as it usually shows itself in persons over 40 years of age. During these periods the patient notices rings (halos) of various colors about gas jets or other flames. The pupil is dilated and the anterior chamber becomes shallow. Eventually the loss of vision becomes permanent. The pain which is transient and slight at first, soon becomes severe and more constant and as the disease progresses, almost unbearable. It is referred not only to the eye itself, but to the region surrounding the eye, radiating over the brow to the side of the nose and cheek and is very apt to be mistaken for facial or supraorbital neuralgia. The eyeball, slightly congested at first, soon becomes plainly red and inflamed, especially in the zone surrounding the cornea (ciliary region), while the scleral vessels

are dilated and tortuous. The cornea is hazy and has a breathed-on appearance and finally becomes more or less insensible to the touch. The tension of the eyeball is distinctly raised, especially at each of these attacks, often returning to normal during their subsidence, but finally the eyeball remains distinctly harder than normal.

On examining the interior of the eye with the ophthalmoscope very little, if any, abnormality can be detected in the early stages, although during an attack pulsation of the arteries may be perceived. In the late stage of the disease cupping of the nerve will generally be noticed. Usually the disease progresses until it ends in complete disorganization of the structures of the globe. The lens becomes opaque, the iris atrophies and hemorrhage takes place in the interior of the eyeball. Bulging of the coats of the eyeball (*staphylomas ectasia*), especially in the neighborhood of the ciliary body, frequently occur from the continuous increase of tension, until the eye feels and looks as if it were going to burst. Indeed, removal of the globe or its contents is often the only measure that gives the patient relief from his intense suffering.

Although these signs and symptoms resemble one another very closely so that the diagnosis is apparently attended with some difficulty, there are certain characteristics which each disease holds particularly as its own and which serve to distinguish it from other inflammatory affections. If these are given careful consideration the observer will experience little trouble in arriving at a correct diagnosis of each case as it presents itself.

The following table will be of assistance in classifying the various ocular inflammations and will show at a glance the main points in diagnosis:

EYEBALL WHOLLY OR PARTIALLY REDDENED WITHOUT DISCOMFORT OR OTHER SYMPTOMS.	EYEBALL REDDENED AND UNCOMFORTABLE BUT THERE IS NO MARKED PAIN.	EYE PAINFUL AND RED.
1. *Subconjunctival hemorrhage.* (a) Redness localized as a deep red, smooth, uniform patch obscuring the scleral vessels. (b) No discharge.	1. *Hyperemia of the Conjunctiva.* (a) Everted lids redder and rougher. (b) Burning, smarting, itching. (c) Foreign body sensation. (d) Discharge slight. 2. *Foreign Bodies in Cornea or Conjunctival Sac.* (a) Constant scratching. 3. *Phlyctenules in Conjunctiva.* (a) Small pimples on Conjunctiva surrounded by patch of blood vessels. 4. *Acute and Chronic junctivitis.* (a) Smarting, burning and foreign body sensation. (b) Mucous, muco-purulent or purulent discharge. (c) Adherence of lids in morning. (d) Injection and swelling of conjunctiva.	1. *Iritis.* (a) Ciliary injection and redness. (b) Photophobia marked. (c) Copious Lachrymation. (d) Tenderness. (e) Pupil contracted and sluggish to light and accommodation. 2. *Glaucoma.* (a) Increased tension of the globe. (b) Attacks of pain, neuralgic in character at first, later more constant. (c) Lowered vision. (d) Pupil dilated. (e) Shallow anterior chamber. (f) Hazy cornea. 3. *Phlyctenules of the Cornea.* (a) Disease of childhood. (b) Intense photophobia and blepharospasm. (c) Lachrymation. 4. *Corneal Ulcers.* (a) Loss of substance. (b) Solution of fluorescin stains ulcer green.

72 Madison Street.

DR. ADOLF MEYER

[The Noted Eastern Psychiatrist who will address the Illinois State Conference of Charities at Rock Island on October 12 next, on the subject: "How Shall the Problem of the Public Care of the Insane Be Solved?"]

ILLINOIS MEDICAL JOURNAL

THE OFFICIAL ORGAN OF THE ILLINOIS STATE MEDICAL SOCIETY.

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OCTOBER, 1908.

ILLINOIS COMMISSION TO INQUIRE INTO THE CONDITION OF THE BLIND.

At a meeting of the State Board of Charities held July 16, last, a commission was appointed to inquire into the condition of the blind in Illinois with a view to formulating plans for the employment of the adult blind and for improving the efficiency of the state care in other particulars. The following were appointed members of this commission: Clara P. Bourland, of Peoria, and Dr. John T. McAnally, of Carbondale, representing the State Board of Charities; George W. Jones, superintendent Illinois State School for the Blind, Jacksonville; C. D. Babb, of Homer, Trustee of the State School at Jacksonville; Joseph E. Otis and E. J. Nolan, of Chicago, trustee of the Illinois Industrial Home for the Blind at Chicago, Mr. Nolan also representing the blind people of Illinois; Mrs. Alice E. Bates, representing the Chicago Woman's Club; Dr. William H. Wilder, of Chicago, representing the Illinois Charitable Eye and Ear Infirmary, at Chicago; Chester M. Dawes, representing the Chicago Board of Education, and Dr. Elmer E. Hagler, of Springfield, representing the Illinois State Medical Society. Mrs. Bourland is chairman. Dr. Hagler is secretary.

The first meeting of this commission was held in Jacksonville, September 17, at the School for the Blind. Professor Wilder addressed the commission, and, from statistics presented, demonstrated that from 40 to 45 per cent. of all cases of blindness were absolutely preventable; and notwithstanding that fact, blindness is increasing in all civilized countries. The largest amount of blindness, he said, comes from ophthalmia neonatorum, or blindness of the newborn. This disease, which is easily preventable, causes from 25 to 30 per cent. of all the blindness. Dr. Wilder also called attention to the prevalence of trachoma in the southern part of the state. Following his lecture Professor Wilder held an informal clinic, exhibiting chiefly children in the school who were suffering from the results of ophthalmia neonatorum and trachoma.

Mr. Jones, head of the State School for the Blind, gave a résumé of the work done in that institution and of the great need of improvement.

Mr. Nolan, blind totally since he was 2 years old, spoke of the work of the Industrial Home for the Blind. What was accomplished, he explained, was accomplished against difficulties owing to the limited equipment and funds.

Miss Bates, of the philanthropic department of the Woman's Club, Chicago, wrote a letter and outlined, as a result of her personal investigation, special work that is being done for the blind in eastern cities and in Chicago.

A subcommittee of three was appointed, to report at the next meeting, consisting of Dr. Wilder, who is to report suggestions for the prevention of blindness and to recommend the enactment of needed laws; Mr. Jones, to report on the needs of his school and to recommend more efficient legislation; and Mr. Nolan, to make recommendations and suggest such laws as will improve the conditions surrounding the employment of the adult blind. The commission decided to devise a method for taking a census of the blind in Illinois. It is estimated that there are about two thousand blind in the city of Chicago alone. It is probable that the census plan will be submitted to the next legislature, as the present commission is without funds for that purpose. In fact, the commission has no appropriation of any sort to draw from.

ILLINOIS STATE CONFERENCE OF CHARITIES MEETING.

Illinois physicians will find much to interest them in the program of the Illinois State Conference of Charities to be held in Rock Island October 10-13, inclusive. The chief medical attraction, not to mention the many other non-medical features of the program, is Dr. Adolf Meyer, director of the New York State Pathological Institute, who recently has been selected to be professor of psychiatry in Johns Hopkins University and director of the clinic in psychiatry in Johns Hopkins Hospital.

THE INSANE.

Speaking of Dr. Meyer's subject the Conference announcement, just from the press, says, under the heading "The War on Insanity":

Insanity is a dominant growing curse in Illinois as elsewhere. This state during the last two years has made giant strides in advance in the care and treatment of its insane. The general public, even many political office holders, have what is believed to be a wrong idea about this disease. Much educational work has been done by the State Board of Charities and its friends during the last two years. The conference, supplementing this work, has secured the consent of Dr. Adolf Meyer to speak Monday, October 12, at 8 p. m. at the Rock Island conference on "How Shall the Problem of Public Care of the Insane be Solved?" Dr. Meyer formerly was at Kankakee. He knows the Illinois situation. He recently accepted the chair of psychiatry in Johns Hopkins University and the directorship of the psychiatric clinic at Johns Hopkins Hospital, both in Baltimore, Md., under the $500,000 donation of Mr. Henry Phipps. Dr. Meyer leaves the directorship of the New York State Pathological Institute to undertake the new work. Thus it will be seen that this scholarly gentleman is fitted to advise the people of Illinois as to the proper, practical method of finally solving the problem of the care of their public insane.

EPILEPSY AND FEEBLEMINDEDNESS.

Regarding epilepsy and feeblemindedness the announcement says:

Classified with insanity are epilepsy and feeblemindedness. Illinois stands in crying need of a colony institution for epileptics. The last legislature could not see its way to appropriate the $265,000 recommended by the State Board of Charities to establish such an institution. This fact only emphasizes the need of urging the next legislature to measure up to the public demand for a proper place for epileptics. Eight other states have epileptic colonies. Dr. George A. Zeller, superintendent of the Illinois General Hospital for the Insane, will address the conference, Monday, October 12, 9 p. m., on "The Modern Treatment of the Epileptic and the Insane." He has both classes at his institution. The lecture will be illustrated by stereopticon.

Dr. W. H. C. Smith, president of the conference, formerly president of the American Association for the Study of the Feebleminded, will make an address, Saturday, October 10, at 8 p. m., on "History of the Care of the Feebleminded in Illinois." This state has much to do for the feebleminded before its service compares favorably with that of progressive states.

TUBERCULOSIS.

Tuberculosis is given a prominent place on the program. The announcement reads:

This disease is the terror of the world to-day. As this pamphlet is circulating the International Congress on Tuberculosis is in session in Washington. The fight on "the great white plague" is as wide as the civilized world. Eleven states of the Union have established state sanatoria for consumptives. The last Illinois General Assembly declined to appropriate $150,000 for such an institution for the treatment and cure of early cases of consumption and as an agent for distributing information how to prevent and how to treat consumption. However, the legislature passed a bill authorizing cities and villages to create local sanatoria for consumptives and to raise money therefor by taxation. Mr. Alexander Wilson, formerly superintendent of the Chicago Tuberculosis Institute, now superintendent of the Chicago Bureau of Associated Charities, will outline a "Working Tuberculosis Program for Illinois." Dr. James W. Pettit, president of the Illinois State Medical Society, and head of the Ottawa Tent Colony for the treatment of pulmonary tuberculosis, will speak on "The Local vs. the State

Sanatorium for the Treatment of Tuberculosis." If possible, one of the noted delegates to the International Congress on Tuberculosis at Washington will be secured for an address.

The section on tuberculosis holds forth on Monday, October 12, at 2 p. m.

BLINDNESS.

A new commission has been appointed by the State Board of Charities to inquire into the condition of the blind in Illinois and to recommend such additional facilities as the state should provide for the employment of the blind and the education of those not now enjoying such facilities. In view of the work of this commission special interest attaches to the address by Prof. George W. Jones, superintendent of the Illinois State School for the Blind, at Jacksonville. His subject, Sunday, October 11, 3 p. m., is: "Duty of the State Toward the Blind." Dr. J. T. McAnally, of the Board of Charities; Dr. W. H. Wilder, of Chicago, and Dr. Elmer E. Hagler, of Springfield, are the medical members of the new commission, whose work is described elsewhere in this issue of THE JOURNAL.

EXHIBITS.

In the Rock Island Public Library, during the Conference, there will be an exhibtion representing the work done by inmates in the state charitable institutions; also a tuberculosis exhibit.

NON-POLITICAL AND NON-PARTISAN.

The Conference of Charities is a non-political, non-sectarian organization composed of public spirited men and women who are interested in the welfare of the dependent, delinquent and criminal portions of the state population. The announcement states:

> Special pains have been taken in preparing the program so that the dominant features of charity may be set clearly before the people of the state in the hope that they, by word and deed, will continue to co-operate with the conference in its voluntary service at a time when there is good promise that the complete regeneration and rehabilitation of the state charitable institutions, already well advanced, are to be acomplished by a friendly legislature this coming winter.

NEW PSYCHOPATHIC HOSPITAL DEDICATION.

A side feature is the inspection of the new Psychopathic Hospital at Watertown, suburban to Rock Island. This institution has a complete hydrotherapeutic outfit. A plan now is on foot to dedicate this new hospital on Saturday afternoon, October 10, and to invite Governor Deneen, Dr. Frank Billings, president of the Board of Charities, Dr. H. Douglas Singer, director of the State Psychopathic Institute, and Dr. J. W. Pettit, president of the Illinois State Medical Society, to make addresses. This would be an especially desirable feature for physicians, since it would afford them an opportunity to get a comprehensive idea of the new way of handling the acute insane in Illinois, in spite of the fact that the last legislature forbade clinics prepared by the State Board of Charities for the education of general practitioners at the district hospitals for the insane.

EDITORIAL CORRESPONDENCE.

HEIDELBERG, Aug. 1, 1908.

DR. GEORGE E. BAXTER, Assistant Editor, Chicago, Ill.

Dear Doctor:—In this letter I will take up briefly the other departments of the University not mentioned in my letter appearing in THE JOURNAL of September. First, I must mention that, compared with many of our American institutions, nearly all of the German universities are poor of purse and, if judged upon the buildings and equipment of many of the departments, do not measure up to the standards of American universities and hospitals where money has been expended with a lavish hand. The fact is that Germany, although showing remarkable improvement in her financial condition since the War of '71, is still poor when compared with France, England and America. Moreover, the maintenance of her immense standing army is plunging her still deeper in debt. She is, however, rich in the mental equipment of her professional teachers and in the consideration shown to science and scientific workers. Her millionaires are few and those she has do not seem to have expended their wealth in endowing the universities to the extent that this has been done in America. The University of Jena celebrated this year the three hundred and fiftieth anniversary of its founding and it was indeed a remarkable occasion for many reasons. Among these was the dedication of the Central University Building, erected at a cost of a million and a half (over $350,000) of marks, the funds being contributed for the most part by private individuals. This building was not the gift of a modern Croesus, but the list of donors included the optical company founded by Carl Zeiss; the City Savings Bank; the publisher, Fischer; the glassmaker, Schott, and last and greatest, Ernst. Abbe, the physicist, who gave nearly his entire fortune to the completion of the work, reserving for himself merely a minimum sum to enable him to live the few remaining years of his life. Another contributor of especial interest to us was a former factory worker in Jena, who had migrated to America and became rich and on this occasion gave thirty thousand marks for the betterment of the new university. Like the University of Jena, the older University of Heidelberg, nearly 525 years in existence, must be considered poor. The buildings in the academic department especially are old, badly lighted and ventilated and located in a poor part of town. The University Library is an exception, being a beautiful building of very modern construction. The medical and surgical clinics are located in the best part of the city, and while the buildings are new as compared with the academic buildings, yet the most of them are not up-to-date in construction or equipment. This is especially true of the surgical clinic, which has overgrown the building originally provided and now occupies a number of barracks of temporary and flimsy construction. To reach the operating amphitheater all patients must be placed on stretchers and carried by two or more attendants up and down one or more flights of stairs and often exposed to the weather. The professors appreciate the disadvantages under which they labor, and told me that they expected in

the very near future to have entire new buildings constructed. Any one familiar with government affairs in Germany will understand that it may be five or ten years before this hope is realized. If there is criticism as to the buildings of the surgical clinic there can be none as to the scientific work carried out and the excellent instruction given by Professor Narath, who was called to the surgical chair from Holland in 1907 as the successor of von Czerny, who had held the chair since 1876 and who in turn has succeeded Gustav Simon, 1868-1876; Weber, 1864-1867, and Chelius, 1818-1864. Professor Narath is one of the youngest living disciples of Billroth and is a credit to his great master. Unfortunately, Professor Narath was prevented by physical disability from giving the courses. His regular student course, however, was continued and all visitors were made welcome. I have never known an instructor of greater teaching ability. The youngsters were uniformly treated with consideration and helped in the investigation of a case. There was no badgering nor assumption of superior wisdom on the part of the professor. Their feeling of respect and affection for him was shown when he made his final remarks at the close of the semester. About 4,100 operations are performed in the course of a year. The aim of the clinic is the scientific study of surgical diseases and no particular effort is made to secure favorable statistics. Many cases are admitted that elsewhere might be refused operation for fear of ruining the record of the operator. Operations on the digestive tract are frequent and not always successful. Hernia operations are frequent according to the original Bassini method and with practically no failures. Gall bladder operations are common and the viscus is always removed. Goitre operations are numerous and are usually done under cocain anesthesia. Appendicitis operations are relatively infrequent. Possibly this is due to the habits of the people. Every bank and nearly all the business houses in Heidelberg close at noon daily. The whole force goes to lunch and returns for business at 2 or 3 o'clock. The law requires all stores to be closed at 8 p. m. Possibly appendicitis would not be so frequent in America were the people to give themselves time to masticate their food properly. Gloves are seldom used in operating, yet there is practically no suppuration. Very fine silk for ligatures and sutures is the favorite material. Catgut prepared by a simple process by the nurses is used at times.

Harvest was in progress in July and because of this a number of cases of division of the tendo achillis were in the wards, caused by the reaper's sickle, which is still almost universally used for cutting grain in Baden. The skiagram is employed in a majority of the cases. Surgery was also exemplified in excellent courses by Professor Jordan in the Children's Hospital and by Professor Vulpius in the Orthopedic Department. One of the most satisfactory courses given was that of Professor Hammer in the newly constructed building devoted to physical methods of healing, such as baths, electricity, massage, hot and cold water and steam douches, poultices, wadding, and many other methods and appliances which have

until recently everywhere been the domain of the charleton or the layman. Professor Credé recently said: "If physicians were better versed in hydrotherapy and other physical remedies the field of operation of many quacks would be greatly curtailed." Some forty-three different procedures are mentioned in the price list. The list of procedures is given herewith:

BATHS AND PROCEDURES WHICH AS A RULE ARE GIVEN ONLY ON THE RECOMMENDATION OF THE PHYSICIAN.

A. *Hydriatic Procedures.*—1. Steam bath. 2. Hot-air bath. 3. Local hot-air treatment. 4. Salt bath. 5. Pine needle bath. 6. Sulphur bath. 7. Chalybeate bath. 8. Oak bark bath. 9. Mustard bath. 10. Carbonic oxid bath. 11. Mud bath, (a) local; (b) complete. 12. Medicated baths (clover, oat-straw, timothy, etc.). 13. Sand bath, (a) local; (b) complete. 14. Douches (fan shape). 15. Alternating douches. 16. Steam and hot-air douches. 17. Foot baths. 18. Alternating foot baths. 19. Shower baths. 20. Sitz baths. 21. Full baths. 22. Half bath. 23. Ablutions. 24. Frictions. 25. Slappings. 26. Universal packs.

B. *Electric Procedures.*—1. Static douches. 2. Arsonvalisation. 3. Electric light baths. 4. Electric radiations. 5. Electric water baths (galvanic, faradic). 6. Sinusoidal bath. 7. Four-cell bath.

C. *Various Forms of Roentgen Therapy.*

D. *Massage.*—1. Partial massage. 2. Complete massage. 3. Faradic massage.

E. *Photographic Roentgen Pictures.*—1. Roentgen treatment.

F. *Inhalation.*

G. *Sunlight Baths.*

Here these methods are applied in a scientific manner and are thus, of course, of much greater benefit than when given haphazard by untrained or ignorant persons. That there is benefit in these methods of treatment has long been known, but the practice of the healing art has so long been limited to the simple giving of medicine that they have been unfortunately neglected. It is to be hoped that the example of Heidelberg in taking up this reform will be followed by schools of medicine in every land. Valuable courses were given also in the eye, ear, nose, throat, venereal and medical departments, but as I did not follow these I can not speak more definitely concerning them.

The close of the courses was celebrated by a *Commers* at one of the leading hotels attended by most of the professors and physicians. A German *Commers* is like most of the Teutonic functions, a rather solemn affair, but in many ways very enjoyable, and this was no exception to the rule, as it gave an opportunity of meeting the participants in the courses in a friendly way and of saying farewell to our friends in Heidelberg. No speeches were delivered, no songs were sung, but all departed home sober and orderly about midnight. As a result of our short visit we shall always have a profound respect for the old University and a sincere wish for her continued success.

GEO. N. KREIDER.

COUNTY AND DISTRICT SOCIETIES

COOK COUNTY.

CHICAGO MEDICAL SOCIETY.

Meeting of June 10, 1908.

A regular meeting was held June 10, 1908, with Dr A. Belcham Keyes in the chair. Dr. Frederick G. Harris read a paper entitled, "The Clinical Value of the Spirochæta Pallida, with Demonstration of the Living Organism." Dr. W. J. N. Davis read a paper entitled, "Intestinal Exsection (15 feet) following Perforation of the Uterus by the Curette; Recovery."* This paper was discussed by Drs. Heinecke, Young, and in closing by the essayist. Dr. A. J. Ochsner read a paper on "Hospital Construction," which was illustrated by numerous stereopticon slides.* The paper was discussed by Drs. Young, Stremmel, Keyes, Steele, Turck, Fisher, and in closing by Dr. Ochsner. Dr. Alexander Aurelius read a short paper entitled, "Operating on the Appendix from the Left Side." This paper was discussed by Dr. Heinecke. Adjourned.

Dr. Werelius read a paper entitled, "Operations on the Appendix from the Left Side."

DISCUSSION.

Dr. A. P. Heineck:—The suggestion made by Dr. Werelius does not seem impracticable to my surgical judgment. Now that it is generally admitted that appendicitis is essentially a surgical condition; and that the health and lives of patients, who have or who have had appendicitis, demand the removal of this organ, it is expedient that the technic of its (appendix vermiformis) operative removal be simplified, be perfected, in all its details. One of the most important steps of appendectomy is the exposure of the appendix.

Many different incisions have been suggested each of which has its advantages in certain cases. The median incision is the only one which I wish to condemn; it is not founded on anatomical grounds, it renders difficult the locating and the delivery of the appendix. The abdominal incisions which we employ for appendectomy may be divided into simple and compound. In the simple type, all the layers of the abdominal wall are divided in the same plane; in the compound type, the lines of the incisions cross as in the McBurney incision or they may be parallel but not coincident as in the incision practiced by Jalaguier. I usually employ the latter; keeping in mind the line of the deep epigastric vessels. They run in an approximately straight course from their origin from the external iliac vessels just above Poupart's ligament to the umbilicus. The gridiron incision we also have employed with great satisfaction.

These different incisions can be made, by the operator, when he stands on the left side of his patient as conveniently as when he stands on the patient's right side. This I can assert positively, as I frequently have been compelled, for the convenience of my classes, to operate while standing on the left side of the patient.

The appendix vermiform is usually an intraperitoneal organ; at times, it is extraperitoneal partly or entirely so. Whether, the appendix be intra- or extraperitoneal, it is reasonable to assume that it can as easily be exposed when the operator stands on the left side of his patient as when he stands on the latter's right side. Standing on the left side, he can, in many instances, more easily call to his service the sense of sight as well as that of touch.

*For paper and discussion see pages 450, 455.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, March 11, 1908.

A regular meeting of the society was held March 11, 1908, with the president, Dr. A. H. Andrews, in the chair.

CYST OF EPIGLOTTIS.

Dr. Jos. C. Beck presented a child, who, when first seen, was cyanotic, spoke with difficulty and presented all the symptoms of a laryngeal obstruction, a condition which was said to have existed since birth. A tumor was palpable in the region of the epiglottis. A laryngoscopic examination was impossible. A puncture of the tumor yielded nothing. A tracheotomy gave relief from the distressing respiratory symptoms. On incising the tumor, a gelatinous fluid was evacuated. The cyst led into the fossa pyriformis and was attached to the epiglottis. A cautery point was passed into the cyst cavity and it was cauterized thoroughly. The child improved and made a good recovery. Speech is normal. At the site of the tumor is an infiltrated mass.

EXCISION OF JUGULAR BULB.

This patient, shown by Dr. Beck, had typical sinus thrombosis, with 40,000 leucocytosis and symptoms of thrombosis of jugular vein, extending down to the level of the thyroid cartillage. The sinus was excised to midway between the torcula and transverse sinus, to back of the mastoid, and down to the formation of the jugular bulb after the method of Alexander.

DISCUSSION OF DR. BECK'S CASES.

Dr. George E. Shambaugh:—These cases of thrombosis of the bulb of the jugular present one of the most difficult problems in the surgery of the temporal bone. It may be difficult in the first place to determine in which cases one is justified in interfering with a thrombus in the bulb, and in the second place the operation required to expose and clean out the jugular bulb may in certain cases present almost insurmountable difficulties on account of the high position of the bulb. I have some preparations where, for example, the upward bulging of the dome of the jugular bulb extends through the superior wall of the petrous portion of the temporal bone. In such cases the exposure and complete cleaning out of the bulb necessitates an operation so extensive that in itself it may be much more formidable than the danger from the thrombus.

The mere presence of a thrombus in the jugular bulb is not in itself sufficient reason for the undertaking of an operation that is always difficult, and may be quite formidable. Whether the thrombus in this locality ought to be removed should depend upon whether it is infected or not infected. If it can be determined at the time of the primary operation on the lateral sinus that the thrombus in the bulb is an infected one, that is, if a foul smelling, broken down thrombus extends up toward the jugular bulb, I believe we are justified in carrying on the operation so as to expose and clean out the bulb. If on the other hand a firm and to outward appearance non-infected thrombus is found extending into the bulb of the jugular, I believe the conservative attitude is the correct one, for should it turn out that the thrombus is as it appeared to be, not infected, experience has shown that the patient is quite safe with the thrombus left alone, and in this way many of these cases can be spared the dangers of a difficult operation. On the other hand, should it turn out that in spite of its normal appearance the thrombus in the bulb is an infected one, which is also possible, though perhaps not probable, then the subsequent history will show a continuation of the septic temperature curve and under such circumstances one is again justified in undertaking the operation on the bulb. In that way alone unnecessary operations can be avoided.

The anatomical variations in the position of the jugular bulb are the most striking. In some cases the bulb is so slightly developed that it can be readily cleaned out by extending a curette forward along the course of the sinus. I have a number of preparations where the dome of the bulb produced a marked

bulging in the floor of the tympanum, and in these cases the bulb could be easily opened and cleaned out from this locality, as has sometimes been recommended. The operation that seems to make it possible always to reach the bulb and effect its exposure is the operation recommended of chiseling away that portion of the temporal bone lying along the anterior margin of the forward extension of the sinus until the bulb is reached. The two dangers in this operation appear to be, in the first place, the injuring of the posterior semicircular canal if we chisel too high, and the cutting off of the facial nerve if too thick a piece of bone is taken off in front of the sinus.

Dr. Frank Allport:—If the thrombus extends back in the direction of the torcula, it had better be left alone. If the thrombus is infected, curette out all the infected portion, going back as far as necessary. That part of the thrombus extending down toward the jugular vein is usually infected and it would not be well to leave it. If I could not curette it without getting severe hemorrhage, I would plug it up and remove the jugular vein, placing the first ligature as far down as possible and get beyond any infectious focus, and eventually I would exsect the jugular vein up beyond the facial vein. I do not believe that the Alexander operation is necessary, and it is being more or less abandoned for that reason. The bulb can be curetted thoroughly without so much risk.

Dr. A. H. Andrews:—I recall a number of cases in which I cleaned out the lateral sinus as best I could with a curved curette, ligated the jugular, cut it off back where it was not necessary to check hemorrhage and the patients got well. I felt sure that had I undertaken to clean out the jugular bulb, the patients would not have stood anywhere near the chance of recovery that they would without that formidable procedure.

Dr. Beck:—I do not believe in leaving an infectious area anywhere near the field of operation, especially when it can be reached. At least the attempt should be made; it is anatomically and surgically possible to remove it. When the clot is infected, it should be taken out; if not, it should be left alone. Free bleeding should be obtained behind as well as below; then you are sure that all of the thrombus has been removed. Puncture and drainage of the bulb through the middle ear is possible, but should not be advised as a routine procedure.

TABES WITH LARYNGEAL CRISES.

Otto T. Freer, M. D.

DISCUSSION.

Dr. Wm. Healy:—The case illustrates that tabes is not only a sensory disease, but partakes of motor qualities. Dr. Harland, of Philadelphia, examined 30 cases of tabes, and found no case of crises or paralysis of the intrinsic muscles of the larynx. This is the first well marked case of laryngeal crises I have seen in 200 cases. Of 1,270 cases recorded in the literature, 4 per cent. had crises. Starr saw 450 cases, with 2 per cent.; Grosvenor saw 251 cases, with 10 per cent. of crises. Other crises are intestinal, rectal, bladder, renal, ureteral, testicular, clitoroidal and cardiac, simulating angina pectoris.

The frequency of paralysis of intrinsic muscles of the larynx varies from 14 to 26 per cent. The abductors are nearly always affected first, but their relationship to the two sides varies greatly. Gerhardt reports 11 cases of posticus paralysis, 5 bilateral and 3 cases in which all the muscles supplied by the recurrent laryngeal nerve are affected. This condition may appear in the very early stage, the preataxic. Semon saw a case in which for two years it was the only symptom of tabes; and it may not appear until the last stage, and very frequently in connection with gastric crises.

Oppenheim found that pressing on the sides of the hyoid bone frequently brings on an attack of laryngeal crises in patients subject to it.

Most authors maintain that practically always the nucleus ambiguous of the 11 and 10 nerve is affected, but others found this not to be true, but found the lesion in the root fibers running up through the medulla or in the vagus itself.

Oppenheim saw one case in which the muscles showed degeneration and none of the nerve fibers or nucleus.

The prognosis of this symptom of tabes is very bad; it may necessitate an operation. Semon points out that in time paralysis of the adductors takes place and the patient then is relieved of all further trouble. He also points out that an operation in such cases is rather dangerous on account of the trophic disturbances which frequently take place in tabes, and he has seen sloughing and failure of the wound to heal after tracheotomy. The treatment generally recommended is painting the larynx with a strong solution of cocain and giving bromids and codein internally.

Dr. J. Holinger:—Some authors claim that the treatment of syphilis is responsible for tabes. I would like to ask whether there was a history of syphilis in this case, and what the treatment was; whether there is any connection between these two, the syphilis and the tabes.

Dr. Freer:—There was no history of syphilis in this case and a careful examination failed to reveal any evidence of syphilis. The lesson to be learned from the case is that laryngologists may be called on to discover nervous diseases through evidences in the larynx, and that all the work done on the innervation of the larynx is German.

SUBJECTIVE SENSATIONS OF SMELL AND THEIR SIGNIFICANCE.

H. Kahn, M.D.

DISCUSSION.

Dr. W. L. Ballenger:—I think that many of the cases reported are not cases of perosmia, inasmuch as the patients had a stinking substance in the nose which they smelled. Perosmia is a hallucination of smell and not smelling foul secretions in the nose. In antrum suppurations very foul odors are perceived.

Dr. Holinger:—I wish to call attention to the fact that not all cases of perosmia have an organic basis. The usual symptoms of a coryza is perosmia. If in such cases the sinuses would be examined carefully, some hint as to the cause of the trouble would be discovered.

Dr. Wm. Healy:—Beginning with the work of Jackson on the uncinate gyrus, neurologists have paid more or less attention to the sense of smell. An important point is its relation to epilepsy. Applying an electrode to motor cells of the cortex would cause the limited production of certain smells and prolonged application would cause a generalized fit over one side or sometimes over both. There have been described a class of fits, the so-called uncinate fits, in which the aura has been that of the sense of smell. It is believed now that many of the so-called hysterical symptoms of perosmia may be due to irritation of the uncinate gyrus. One of my patients, a young girl, perceives an odor emanating from her body and from her bowels. She has ideas of persecution, which makes up a nice picture of paranoia. She has been treated vigorously, and it is possible that there is some organic disease, because she has not been relieved.

Dr. Kahn:—I gave only a clinical classification in my paper. These are subjective symptoms, and if objective proof is found, it becomes an objective symptom. They might be classified as true and pseudo-perosmias; the true being of nervous origin, with no definite organic change, and the pseudo those in which the cause is concealed. As far as digging around in the sinuses is concerned, it is known that perosmia is only found in diseases of the ethmoid sinus and the antrum of Highmore, the sphenoid and frontal sinuses never causing any such symptom when diseased.

THE TECHNIQUE OF ADENOIDECTOMY AND A PERFECTED CURETTE.

F. Gurney Stubbs, Chicago.

There is no apology needed for bringing before a body of such distinguished laryngologists as this a paper on this subject; for the last word has not been said regarding either the anatomical consideration of lymphoid tissue in the nasopharynx, or the technique of its removal. And the latter depends absolutely upon the former.

In the first place we have to deal with a part of what is called "Waldver's ring"—that is, encircling the entrance to the pharynx we find in or under the mucosa, more or less continuously, lymphoid tissue, which in four points is massed, giving us the four tonsils, lingual, pharyngeal and faucial. These are found in all cases, in adults as well as in children, though in some they are so small as to seem at first glance to be absent. Occasionally we see cases where the whole ring seems to be enlarged, so that there is no line separating the lower pole of the faucial tonsil and it seems to continue well down towards the larynx and over on to the tongue; numerous follicles show on the lateral pharyngeal walls posterior to the posterior pillar of the tonsil; and, where a view can be obtained, the lateral recesses of the naso-pharynx (Fossa of Rosenmueller) are also seen to be thickened. But this rather rare condition does not for a minute lead one to regard the tonsil as any the less a circumscribed body nor do we attempt to go beyond this tonsillar body in its removal.

In like manner we must regard the pharyngeal tonsil. There is always a central mass, larger and thicker, no matter how much increase there may be in lymphoid tissue laterally. While the pharyngeal tonsil differs little in structure from the faucial, yet the pathological changes may be divided into four varieties:—the soft, diffuse, composed largely of lymphoid structure; the edematous or cyanotic; and the hard or hypoplastic, due to an increase of lymphoid structure and a decided overgrowth in the connective tissue element.

In all cases the adenoid is lobulated, the lobes lying close together so as to have their adjoining sides flat and the lateral ones shorter and not so deep, so that on its removal it has a rather circular outline. I have often found cheesy masses of epithelial débris similar to that found in tonsillar crypts, which was retained by the superficial edges of these lobes becoming adherent and forming a sort of pocket.

The next step is to study the anatomical seat of the adenoid. This is on the vault of the pharynx. I use the word vault advisedly, for two reasons. First, the adenoid proper does not extend into the Fossa of Rosenmueller. If that space, which is the lateral angle of the union of vault and lateral wall of the pharynx, is anyway encroached upon it is only due to an increase of the lymphoid tissue normally there and is not the adenoid proper.

Secondly, the same condition is present where there is any thickening on the posterior wall below the adenoid. The adenoid is attached only by its posterior edge to the posterior wall. Its basis is entirely on the vault. By the term vault I mean that part of the pharynx which is nearly horizontal, beginning anteriorly at the junction of the vomer and sphenoid, extending posteriorly to where it curves downward to the perpendicular, on the anterior surface of the atlas and axis. It is the basilar process of the sphenoid and occiput and is fairly level. The lateral walls of the pharynx meet the vault at a right angle. Hence we have a well defined body attached to a fairly level or sloping surface and it only needs a proper knife to slice it off.

This is met by the so-called adenoid curette. But not by any and every curette one will find in the shop. By a study of the skeleton, cadaver and live subject I find that the shape of the curette is absolutely essential to a thorough removal. Further, it must be used correctly. With a correct instrument and a correct technique the adenoid should be removed entire with only one sweep of the knife.

I have altered the well-known von Beckmann curette as to the angle, depth and curve of knife, width of side or supporting pieces and their position as to recession from edge of knife. By its correct use it does not curette or scrape, but slices the adenoid smoothly from its basal attachment, with the individual lobes entire and included with their base. It is necessary to use an instrument as wide as will snugly fit into the vault and reaching from one lateral recess to the other. To meet this, I have chosen three sizes which will suit all ages, the inner cutting edges being, respectively, 13, 16, 19 mm.

If the patient is in the erect position, with or without an anesthetic, or prone position under general anesthetic, the procedure is the same.

The mouth is opened to the fullest extent, and for this I have modified the Murdock self-retaining mouth-gag. This is actually self-retaining and is not in the way, allows the patient to be turned from side to side without removal, and can be quickly removed by the finger rings I have added as easily as one would wish. A tongue depressor is of assistance in allowing a free view, to see that the curette is passed between the posterior pillars and up back of the uvula, and then withdrawn.

As soon as the back of the knife is raised above the uvula it is drawn forward to the vomer and, hugging its posterior edge, is pushed as tight to the vault as possible. It is then forced directly backward in a horizontal plane till it reaches the posterior wall, when the handle is sharply elevated and the knife cuts into the angle which is there present. Elevating the handle still more causes the knife to cut one to one and a half cm. down the posterior wall, at which point the lower limit of the adenoid is reached. Then a quick withdrawal of the curette will sever the adenoid from its attachment at its lower periphery and in many cases precipitate it on the floor. If this does not occur, it will lie on the lateral wall of the pharynx if the patient is on its side (the correct position) and can be withdrawn by fingers or forceps. No hood to catch the adenoid can be attached to a curette without impairing its usefulness. The dangers of obstructing the larynx by the detached adenoid is most theoretical anyway.

To explain the reason of this detail: First, the back of the knife must hug the back of the vomer all the way up in order not to force any lobes or parts of lobes into the posterior choana and thus interfere with the knife properly applied entirely in front of the adenoid. This can not be done where the knife is first applied to the posterior wall of the pharynx and then drawn up over the adenoid and accounts why so often after its use a fringe of adenoid remains at the posterior choana and the symptoms of obstruction are not relieved.

Second, the direction of the stroke of the knife must first be directly backwards, and only after it meets the posterior wall should it be made to cut downwards. My observations have been that too many operators depress the knife with the beginning of the stroke and then return and make the same mistake for seven or eight strokes more and have only a few pieces and much blood to show for all the misdirected scratching.

Third, the downward stroke on the posterior wall should only be for one to one and a half cm., and then a quick pull or jerk forward to free it and if possible throw it entirely out of the mouth. There is no excuse for stripping the posterior wall, as is so frequently done. This is caused by scraping below where the adenoid is attached and by the wrong angle of the knife. I have set the knife at such an angle that it cuts horizontally on the vault and on the back wall will not scrape it down if drawn sharply forward as soon as the adenoid is separated above. It is also straighter on its upper and cutting edges and its supports recede so that it can approach the posterior wall flush to its union with the vault and thus not leave a mass of adenoid tissue in the angle. If one will compare many as found on sale it will be seen that the knife edge can not cut at all on the vault, but only with a downward motion on the posterior wall. It is narrow so as to allow its being raised anteriorly to the adenoid and thus leaves none where it is most essential to be removed.

Lastly, while more delicately formed it is hand forged and thus can be relied upon not to break. And it should be kept sharp, for it is not a scraper but a knife.

I believe too much importance can not be attached to the details I have brought out, both in instrument and technique, if we are to completely remove adenoids as they should be. One can readily see from a study of the adenoids I present that they are complete in their entirety and I have proven them so by both digital examination and rhinoscopy where accessible. By the study of same one also sees that adenoid forceps only tears away fragments, leaves a ragged, uneven surface, can not get down to the absolute base, nor can they reach into lateral recesses as well as a properly fitting curette. In an infant

one can not even manipulate forceps. I have found no trouble at all in using curette No. 1 in an infant six months old. In such a case very little force is required for the adenoid is soft, but it will be found just as complete as in older patients.

There are two chief indications for the removal of adenoids: first, where they act as an obstruction to nasal respiration by blocking the posterior choanæ or where they encroach on the Eustachian eminences. Second, where by their formation of pockets they act as an atrium of infection similar to the tonsil.

These indications can be absolutely met by this curette in their removal. It is true it will not cut laterally and dig into the fossa of Rosenmueller, but it is not necessary in meeting the ordinary indications. That would be attempted only in the special cases where the lymphoid (I do not use the word adenoid) tissue is in such increased amount that the aurist sees the special need for its removal. Then it would be accomplished by special curettes, as the lateral ones of Fein, Mygind and others. This rather rare procedure I would disregard in all but special cases.

A study of the exudative diathesis of Czerny would show us that removal of more than the bodies of tissue meeting the two indications I have named would be unwarranted, as the lymphoid tissue is not a cause *per se*, but only a manifestation of systemic conditions.

103 State Street.

DISCUSSION.

Dr. E. Pynchon:—I wish to indorse the angle in which the cutting blades are placed. It is the only natural angle whereby one can curette the entire vault. The only criticism that can be made is that the blade is in a straight line. The pharyngeal vault is high and arched, and putting a straight line across it does not enable one to touch all the surfaces, which are rounded. The blade should be curved. The vault also gets smaller toward the top and a straight-angle knife can not go clear up to the top. If the blade were curved it would be just as effective. I have a curette which is curved and has side cutting blades, so that the fossa of Rosenmueller can be curetted. Ten years ago I designed an adenoid curette the upper blade of which was placed at the same angle as Dr. Stubbs'. It was also curved, and it was provided with side cutting blades, so that the fossa of Rosenmueller could be curetted.

Dr. W. L. Ballenger:—I wish to call attention to the anomalous formations of the pharyngeal vault, and it is obvious that not many curettes made will meet all these conditions and remove the tissue. I think that Dr. Stubbs' curette is one of the best, but the curette of Dr. Pynchon, designed some years ago, with a backward sweep of the blade, would be successful where Dr. Stubbs' curette would fail.

Dr. Henry Gradle:—I think that the curette is correctly designed and that it is applicable to the slight variations of the pharynx met with in practice, and that with moderate skill and some practice the mass can be brought out in one piece with one sweep. But it presupposes some practice and skill, and to minimize that I designed the automatic guillotine or curette. It is very similar in curve and form to the Stubbs curette. The knife of the guillotine does break once in a while, but only in one place; but all that is necessary is to put in a new knife. The particular advantage of the guillotine is that it adapts itself automatically to the shape of the pharynx, and if the operator remembers to push it upward firmly enough, sliding along the posterior edge of the vomer, he can not fail to bring out the mass, even with little skill. But with more skill Dr. Stubbs' curette will accomplish the same purpose as thoroughly and as satisfactorily.

Dr. Joseph C. Beck:—I use the Barnhill curette and have no trouble in getting out the adenoids in one mass. One might have trouble with Dr. Stubbs' curette in cases where there is a deformity of the wall of the pharynx or a protrusion of the atlas, and extreme care would have to be used in making the forward and upward sweep not to cut the mucous membrane. The greatest trouble the average

practitioner has is to sweep downward. I have modified the guillotine by making the blade work upward, thus preventing a breakage. I use a solid blade, devised by LaForce, and it does the work very nicely.

Dr. F. G. Stubbs:—It is true that no single instrument can be made that will fit all cases, but I believe that this one will in the great majority. The reason that I made the knife blade nearly straight on its upper surface was that I found it would gouge too deeply in the median line, in many cases, if it had much curve.

What Dr. Gradle claims for his adenotome is true, yet it is also true that it can not adapt itself to varying shapes of the vault as the curette. Further, as one should use as large an instrument as will fit into the vault, at least three sizes are needed, and this makes a very expensive outfit.

Replying to Dr. Beck, I would say that my curette differs from Dr. Barnhill's in that the supporting sides recede directly from the knife, while the knife is straighter, more flat and much narrower, apparently small differences and yet essential to a complete removal. And this complete removal should be done with only one sweep of the curette.

Regular Meeting, April 14, 1908, the President, Dr. A. H. Andrews, in the Chair.

SUPPLEMENTAL REPORT OF A CASE OF XANTHOMA, WITH EXHIBITION OF PATIENT.

JOHN EDWIN RHODES, M.D., CHICAGO, ILL.

I presented this patient before this society in May, 1906 (see *Laryngoscope*, October, 1906). A few days after his presentation here it became necessary to do tracheotomy to relieve his breathing. He is now wearing the tracheotomy tube, and has done so since that time. Permit me to recall a few points as to the disease and the history of this patient for the benefit of those who did not see him at that time. Briefly, xanthoma is a perfectly benign neoplasm, and is of a fibro fatty character, deposited in the corium. This patient presents the two forms in which the disease is usually seen, the plaques and the nodules. There were also the lesions as they are found on mucous membranes, although those that were present in the fauces have disappeared, that on the conjunctiva of the left eye is much less prominent now than then, and had at one time disappeared entirely.

The multiple forms seen here are rare in one individual, and when found in young people are usually congenital, but when found in adults are often associated with chronic jaundice, or with glycosuria as in this case. The most common form is the xanthoma palpebrarum, which is not so rare. The lesions on the eyelids were marked when this patient was shown before, but have almost entirely disappeared now. The lesions on the skin have a deposit of pigment, varying from a light yellowish or brownish color to a deep bronze. The very rare condition shown here, the patches on the conjunctivæ, are of a light yellowish color, and, while that on the right eye is large, its position is such that it does not affect his vision, and is absolutely unirritating in its presence. The lesions on the neck have faded somewhat, but those about the shoulders, the gluteal region, the penis, the scrotum, etc., remain about as they were. They are little indurated, except the nodules on the penis, are little raised from the surface, and over some parts of the body are smooth and level with the surface. The patient is 20 years of age, the mother is living and well, and the father died of cerebral hemorrhage about three years ago. There is no history of any similar disease in the family. He has never had any severe illness, there has been no venereal trouble, and he has never used alcoholics or tobacco.

His present illness began about six years ago, the first symptoms being an intense itching of the eyelids, shoulders, etc. This was felt at intervals, and finally the eruption appeared simultaneously on the eyelids, neck, shoulders, penis, scrotum, and other parts of the body. Four years ago he began to have an intense and constant thirst and to pass large quantities of urine, which now

amounts to from seven to nine quarts a day. When he first presented himself to the society he complained of spells of dizziness and faintness, lasting a couple of minutes at a time, at intervals of two or three weeks at first, which had gradually increased in frequency to several attacks daily. In addition to this symptom, there was an increasing difficulty in breathing, which was progressive in severity, and was very marked at that time. This became so pronounced that the tracheotomy was performed on the 3rd of May, 1906.

This is the point in this case that makes it one of peculiar interest to the laryngologist, for it is the only one on record, so far as I know, where a xanthematous lesion in the larynx has caused enough obstruction to necessitate such a procedure. When he was examined in 1906, the soft palate showed small, irregular patches of congestion, not raised from the surface and without pigmentation. There was a slightly nodular condition of the pharynx. The right pillar of the fauces was somewhat contracted at the site of an old lesion, as was also the tip of the epiglottis. In the larynx the nodules were so thickly placed that the vestibule was almost occluded, leaving only a small opening between the vocal bands and the vocal cords, two or three millimeters, for the passage of air. In a recent examination I found that the lesions in the fauces had practically disappeared. Thorough cocainization is necessary to examine the larynx, drawing forward the epiglottis, giving a good view. The change is here marked, the swelling having subsided about 50 per cent., so that the vocal cords are now visible, in part, and respiration through the larynx is fairly easy. The patient, however, has often experimented in removing the tube for a time, but has found it necessary to replace it, as his breathing soon became much too labored for comfort. I hope, from the improvement that has taken place, that he will some time be able to remove the tube permanently.

His general health is now excellent. His gain in weight since the tracheotomy has been forty pounds, and during all the inclement weather of the past winter he has followed his occupation, driving a milk wagon. I would call your attention to his voice, which is clear and strong, and which can be heard in all parts of the room, without closing the opening in the tube, which he protects with a few thicknesses of gauze. At first I gave him a tube with a ball valve, which allowed the ingress of air, but was closed on expiration. He discarded this very soon, as he could not breathe easily. I then substituted one with an oval opening in the upper surface of the tube, allowing free passage of air from the trachea to the larynx. This opening has seemed unnecessary, and since February 1 he has worn an ordinary tube, and the amount of air passing about it to the larynx is sufficient for good vocalization.

Dr. John Edwin Rhodes exhibited an unusual case of exanthoma, "Tuberculous Laryngitis."

Dr. Geo. E. Shambaugh exhibited a patient, 50 years old, who first began to complain of hoarseness about a year ago, but who suffered no inconvenience until a few weeks ago, when there appeared dysphagia. The condition is growing gradually worse, but there is no evidence of tuberculosis. Microscopic sections, however, show the typical tuberculous infiltration with giant cells.

Dr. Norval H. Pierce reported a case of "Chronic Suppurative Otitis Media with Thrombosis of Lateral Sinus and Jugular Bulb and Cerebellar Abscess, Operation and Recovery."

DISCUSSION ON DR. PIERCE'S CASE.

Dr. Joseph C. Beck:—There were two points of interest in this case: first, the presence of cerebellar abscess without symptoms; second, the chill. In a case recently under my care a diagnosis of labyrinthine disease from symptoms such as nystagmus, staggering gait, etc. On exposing the labyrinth I found it unaffected, but there was a perisinusoidal affection and compression of the cerebellum, which was producing these symptoms. When I cleared up this condition the symptoms disappeared. Therefore, may not the nystagmus in Dr. Pierce's case have been one of the symptoms of cerebellar abscess? As to the second

point, the chill, I have learned by experience that when this chill has occurred to suspect sinus trouble and I expose the sinus at once. I have operated recently on such cases with gas-oxygen anesthesia to my absolute satisfaction. There is no danger of collapse and prostration. I would like to ask Dr. Pierce whether the facial paralysis cleared up.

Dr. Frank Allport:—Would not the fact that there evidently was labyrinthine involvement serve to indicate that there was a brain involvement as well? In doubtful cases I get considerable assistance from a blood examination, macroscopical and bacteriologic. Finding streptococci in the blood would lead one to believe that there existed serious involvement of the sinus and brain, or either one. I always have blood counts made, as I like to know the percentage of polymorphonuclear cells and lymphocytes. Such examinations are of great assistance in diagnosis. I agree with Dr. Pierce in the deductions he has drawn from this case. I believe in a full exposure of the sinus in such cases, and in doubtful cases taking off the outer osseous covering of the sinus and the dura. I do not think that we can always make a positive diagnosis in these cases. In one case, with few symptoms, we opened both mastoids and found serious involvement of both and then opened the sinus and found a streptococcus infection. The symptoms are not always clear-cut and well defined, but I think that we can draw deductions from the conditions as we see them.

Dr. Geo. E. Shambaugh called attention to the fact that the nystagmus and ataxia which occurs in cases of cerebellar abscess are not unlike the same symptoms arising from a pus infection in the labyrinth. The cerebellar abscess of otitic origin arises usually from an extension through an involved lateral sinus or by way of the labyrinth. If the cerebellar abscess follows secondarily upon suppuration of the internal ear, one may be able to diagnose the occurrence of a cerebellar abscess by finding a complete destruction of hearing and an absence of increase in nystagmus and vertigo by the Barney method of syringing the external canal with hot and cold water.

Dr. Pierce (closing the discussion):—The nystagmus can be accounted for by the findings in the labyrinth. It was labyrinthine nystagmus because the condition disappeared after operation on the labyrinth before the cerebellar abscess was opened. The facial paralysis has disappeared almost completely. There is very little lack of movement on that side of the face. A blood count was made a number of times, but I place less and less dependence on it as I go on with this work. In positive cases we do not have to make it, and in doubtful cases it is too uncertain and not always of value. This was undoubtedly a case of sepsis, but the question was, where was the pus being poured into the venous channels? On account of the condition of the patient and the fact that the sinus appeared to be normal, I deemed it best to delay opening it.

THE SIMULATION OF MASTOID DISEASE BY FURUNCLE OF THE EXTERNAL MEATUS AND PERI-AURICULAR ABSCESS.

H. Gradle, M.D., Chicago.

(Abstract.)

The speaker pointed out that there are comparatively rare instances in which mastoid disease is simulated more or less closely by either furuncles in the meatus or abscesses around the meatus. He showed by illustrating cases that small deeply seated furuncles in the posterior wall of the meatus may at first escape detection, while the swelling, pain and tenderness over the mastoid suggest purulent disease in the depth of the bone. Pale edema over the mastoid is indicative of a furuncle while inflammatory edema or infiltration suggest true mastoid involvement. This history of acute onset without involvement of the middle ear is generally a valuable guide in the distinction between furuncle and mastoiditis.

Even more difficult may be the diagnosis between an abscess around the meatus and mastoiditis. The external abscess may be secondary to a furuncle or a diffuse otitis external. In one of the cases it was due to the burrowing of the pus from a peri-tonsillar abscess. There is a good deal of fever present. When a pale and normal drumhead can be seen mastoiditis is almost out of the ques-

tion. Some reliance must be placed on the history of the acute onset and the relatively slight involvement of the general health in peri-auricular abscess.

Dr. Gradle showed a salivary calculus about the size of a large pea. The patient had had attacks of painful swelling of the submaxillary gland lasting weeks at a time. Even between the attacks the gland was enlarged and somewhat tender, a concretion could be felt in the duct underneath the tongue. It was scooped out after an incision under cocain injection. Uneventful healing. Gradual return of the salivary gland to its normal condition in about a month.

DISCUSSION.

Dr. J. Holinger: Although the differential diagnosis between mastoid abscess and periauricular abscess is exceedingly difficult, it can be made. I often give this question in competitive examinations, and while the answer appears to be an easy one, it is not. In three cases of swelling of the parotid gland the diagnosis was extremely difficult; in another case a mastoid operation became necessary because the mastoid was involved later on. The parotid was incised for pus. The temperature increased from 101 to 103 F. The inflammation of the gland and mastoid was influenced favorably by interdicting the administration of fruit juice.

Dr. Norval H. Pierce: The differential diagnosis between the swelling back of the ear caused by furunculosis of the external auditory canal and swelling behind the ear from mastoid disease, is very simple. In the former, there is *edema* of the ear, and in the latter, there is *infiltration*. In the one case (edema) the swelling pits on pressure and in the other (infiltration) it does not. In infants, there may rarely be some edema in mastoid disease, but it almost never occurs in adults, and is not so marked. A case happened in my experience where a consultant in a large city was called to a small country town to operate for mastoid abscess. The patient was a young adult complaining of pain in and about the ear, fever and with marked swelling behind the ear; the auricle was disreceived the attention it should, either by ophthalmic surgeons or the *x*-ray placed downward, outward and forward, and the external auditory canal was so filled up that a view of the tympanic membrane could not be had; but on the mere fact that it was edema and not infiltration back of the ear, the diagnosis was correctly made.

Dr. O. T. Freer: An old gentleman had repeated swelling of the parotid, non-septic in character, occurring about once a week, and looking like a case of mumps. I knew that he had a recurrent parotitis, but could not discover the cause. A prominent surgeon said that there was dead bone in the jaw, which he wanted to remove, but the patient objected. He came back to me and consented to an opening of the duct of the gland. I took out a fish bone, and the patient promptly recovered.

Dr. Frank Allport: I agree with Dr. Pierce as to the diagnostic significance of edema and infiltration, but I have seen edema present in both cases. As a rule, the diagnosis of furunculosis is an easy one, and yet I can readily understand how one can be misled. I have had cases where I had to hold the diagnosis in abeyance, especially when it is not a simple case of furunculosis; where the starting point is a middle ear involvement, with more or less chronic discharge, followed by infection of the canal producing furuncles.

Dr. J. C. Beck: I want to call attention to a positive diagnostic point, and that is the skiagraph. In furuncles if the mastoid is clear, except when there is also mastoid involvement, as in Case 3. The skiagraph shows not only the involvement of the mastoid, but the degree of involvement.

Dr. A. H. Andrews: I find the transilluminator very useful in doubtful cases.

CHICAGO OPHTHALMOLOGICAL SOCIETY.

Meeting of May, 11, 1908, the President, Dr. T. A. Woodruff, in the Chair.

SYMPOSIUM ON INJURIES TO THE EYE—DIAGNOSIS OF METALLIC BODIES IN THE GLOBE.

Dr. Gordon G. Burdick (by invitation) stated that this subject has never

operator, owing to a genereal want of information regarding the procedure. He described the methods employed for locating foreign bodies in the eye with the x-ray and pointed out that the ray is infallible as a means of diagnosis, although failures do occur. These must be charged to the human element in the work. Cases should be sent to the skiagrapher for diagnosis and not for the skiagram only because the *x*-ray operator is more capable of reading a plate than is the ophthalmic surgeon or any practitioner not specializing in this work. Dr. Burdick also presented an instrument devised by him by means of which the three known methods of locating foreign bodies in the eye can be carried out, the Grossman, Sweet and Fox methods.

INDICATIONS FOR ENUCLEATION AND ITS SUBSTITUTE.

Dr. George Fiske believes that the one good substitute is exenteratio bulbi. It is adapted to all cases, except tumors. The advantages of the methods are: (1) increased mobility of the stump; (2) leaving the sclera, thus not inviting infection; (3) less likelihood of eversion of the lids and swelling of the soft parts; (4) the artificial eye is much better worn. Dr. Fiske emphasized the necessity of removing entirely the contents of the bulbus, leaving no shreds of chorioid, particularly about the optic nerve entrance. Instead of the glass ball, he favors the use of some pith-like substance which can be included in the blood clot and become organized afterward.

MIGRATORY OPHTHALMIA IN ITS RELATION TO INJURIES OF THE GLOBE.

Dr. H. W. Woodruff called attention to the serious complications which may follow perforating wounds of the eyeball and operations on the same. Acute purulent processes can, in most instances, if dealt with in the first twenty-four hours, be checked by deep injections of cyanid of mercury. Among 199,454 cases at the Illinois Eye and Ear Infirmary only 108 cases of migratory ophthalmia have occurred. The removal of all eyes blinded from traumatism is the best prophylaxis, especially if tension is subnormal. Woodruff has employed large doses of sodium salicylate in nearly all cases of serious injury not demanding immediate enucleation. Mercury must be used until the physiologic effect is produced. He emphasized that an eye with poor projection and lowered tension should be removed, provided that the lowered tension is not due to the long-continued use of atropin. The general condition of the patient must be looked after. As a rule, the most that can be hoped for is that the active symptoms will subside, leaving the iris firmly adherent to the capsule of the lens, which in all probability is not cataractous. After a year or eighteen months, if there has been no recurrence of the inflammation and the intraocular tension has not been diminished, the patient's perception of light being satisfactory, operative intervention may be considered.

SOME POINTS CONCERNING THE TREATMENT OF THE COMMONER PENETRATING WOUNDS OF THE EYEBALL.

Dr. Frank Allport discussed particularly the steel and iron injuries in workmen. He emphasized the importance of prompt and early treatment. He said that intraocular foreign bodies are always dangerous and should always be removed, if possible. The *x*-ray should be employed for diagnosis, and also the magnet, and when both these agents fail to disclose a foreign body, it may be assumed that none is present. Unless the fragment is located anteriorly and can easily be removed by the forward route, Dr. Allport favors extracting it through a scleral opening, which he considers to be much safer than dragging it over the delicate and sensitive tissues of the anterior portion of the eyeball. No attempt should be made to suture the scleral opening, because it necessitates too much pressure, the needle might break off in the eyeball, and infection may occur. It is quite sufficient to suture the conjunctiva with catgut. The danger of infection and retinal detachment are less by this method than by extraction by the anterior route. Before operation he employs a 25 per cent. argyrol solution and after the operation he usually applies over the closed lids a thin coating

of Credé's ointment on a piece of gauze. Daily dressings are made. Rest, dieting, catharsis and large doses of salicylate of soda are a part of the treatment. He considers it a mistake to attempt to preserve an eyeball in which vision is hopelessly destroyed and which is badly mutilated, especially when the mutilation is in the ciliary region.

Dr. Casey Wood was glad to know that Dr. Burdick took all the responsibility on localizing foreign bodies in the eye. He was in the habit of declining to look at skiagram plates because he did not consider it to be within his province or his ability to decide whether, in doubtful cases, a certain mark or spot on the plate indicated a foreign body or not. Of course, when a large body enters the eye, it is easy to demonstrate its presence not only by the skiagraph, but by means of the ophthalmoscope, sideroscope, Haab's magnet, etc.; it is very small bodies that give rise to difficulties in diagnosis. It is for the skiagrapher alone to deliver the opinion in these cases; it is better for the patient and for the ophthalmologist. Dr. Wood also referred to those cases in which there is a penetrating wound of the cornea, iris or lens and yet no foreign body is found in the globe or orbit, the missile having entered the eye and dropped out again. Before the days of easy localization of intraocular foreign bodies he scouted the idea of the existence of such cases, but he is now convinced that they are not very uncommon. He took exception to Dr. Allport's method of extracting foreign bodies through a scleral incision rather than to draw them into the anterior chamber with the magnet, after the plan of Haab. Although the latter procedure would seem, at first, to produce a more extensive trauma of the anterior part of the eye, he thought the results are better. Of course, he said, if everybody extracted these bodies as skillfully as Dr. Allport, the argument would not be so strong in favor of Haab's method, but in the average extraction as made by the ordinary practitioner, the danger of infection and other accidents is increased.

Dr. Wood feared that physicians, as a whole, do not realize the dangerous character of finger-nail wounds of the cornea, as in the case reported by Dr. Fiske. They are not, as a rule, the simple things they seem to be. There is, he said, no slight external wound of the eye that is more serious and more likely to cause trouble.

Speaking of the involvement of the sympathizing eye, he asked how we are to know when an incision of the anterior of the eye will produce a migratory ophthalmia and when not. He referred to Randolph's experience with toxins made some years ago, in which he showed that bacterial toxins, as far as the tissues of the eye are concerned, are just as destructive as the bacteria that excrete them, and inasmuch as toxins can be readily carried from one eye to the other, why not believe that migratory ophthalmia is essentially a toxin invasion from one eye to the other? He thought the term "migratory ophthalmia" is more expressive of the condition than the "transferred ophthalmitis" of Oliver. Dr. Wood has frequently attempted to introduce into factories devices for preventing penetrating wounds of the eye. In Germany, where there is a large state insurance for operatives, the authorities insist on workmen using goggles and other forms of protection against injury. One factory in this city that provided goggles for workmen could not persuade the men to wear them, although they daily observed about them examples of eyes lost from plainly preventable injuries.

Dr. W. A. Fisher stated that four years ago when reporting a large number of cases to this society he advocated removing the foreign body first and making the picture later—if the foreign body could not be found. He has not had any occasion to change his views. Like Dr. Wood, he does not care to see the plate, but wants to have the skiagrapher make the diagnosis, if the diagnosis be made that way.

He felt that if Dr. Allport had a foreign body he would not want it removed in the way he suggested. If the lens is injured by a foreign body, there is no reason why much more injury can be produced by removing the foreign body through the cornea. If an incision is made in the sclera detachment of the retina

may follow. He referred to a boy, nine years old, who was injured in the right eye. Two months later when first seen he was practically blind in both eyes, hopelessly in the right, with a fully developed sympathetic inflammation in the left. He used fluorescin for the first time in such cases in this case, with a negative result. He removed the exciting eye within two hours after the patient's first visit to him. A short time after using fluorescin in this case he saw a case in consultation with Dr. Colburn that was thought to be sympathetic inflammation. Fluorescin was suggested and used as in the first case with a negative result.

Some days later when trying fluorescin on a case of cyclitis several instillations were used and the deposit beautifully demonstrated. The two cases of sympathetic inflammation were again tested by dropping in two drops of a 1 per cent. solution of fluorescin every five minutes for one-half hour. The deposit could easily be seen on Descemet's membrane in both cases while no deposit could be seen on several normal eyes that had the same solution dropped in the same number of times. He did not mention fluorescin as being new, but thought the application of its use was not fully understood. He is of the opinion that fluorescin if properly used should have a place as a means of diagnosis in injuries of the eye.

Dr. Charles H. Beard, speaking of the more extensive perforating injuries of the sclera, emphasized that early treatment is important. If quick healing, without complications, can not be effected, the treatment is in vain. Even in the most severe cases with extensive involvement of all the tunics, it may be in the ciliary zone, such healing may take place if conditions are favorable. How make them favorable? Make sure of the absence of a foreign body; use copious, warm, mild antiseptic irrigation, and remove all shreds of uvea, retina and vitreous. He believes that small wounds, and even quite extensive ones that are meridional, may often be left without sutures, simply cleansed, extruding vitreous snipped off, and the conjunctiva stitched over them. If the scleral wound inclines to gape widely, it should be sutured. If the scleral and conjunctival wounds correspond, the same threads may include both; if they do not, it is best to close the scleral opening with absorbable sutures and the conjunctival with silk. Indeed, it is usually best that these wounds do not correspond even if a piece of conjunctiva constituting one lip of the wound must be excised to prevent coincidence. The wound is not only freed from dirt and vitreous, but from shreds of chorioid and retina if these are present. Double-armed interrupted sutures are preferable, so that the needle can be introduced from within on both sides. The thread should, if possible, be made to include only the outer layers of the sclera, and in no case should the uvea and retina be included either in the wound or in the suture. Thread and needles should be very fine and the latter sharp. For the after-treatment little is to be said. He would trust more to thorough, even exhaustive, first aid than to occlusive bandaging, rest in bed, diet and general or constitutional treatment. Argyrol discs, or in solution, is a valuable adjunct to the dressing.

Dr. Henry Gradle stated that the all-important question in connection with any perforating injury is: whether there is infection present or not. If the injured eye is not infected it is not dangerous to the other eye; but if the eye becomes infected, it is always a source of anxiety to the surgeon because he can not tell whether secondary involvement of the other eye may follow or not. How can one tell whether the first eye is infected? In some cases it can be stated positively that there is no infection. There is only slight ciliary injection limited to a narrow zone; or there may be only a little injection around the wound. These cases are positively not infected. On the other hand, any one of experience can see that certain cases are infected by reason of the extensive vascular reaction. But there are cases where one can not be sure that infection is not present or where, if it is, it surely is but very mild and may be overcome by the tissues. These are cases where the surgeon's responsibility is greatest.

If the foreign body is in the eye, even without infection the injured eye is always in danger. Iron will almost invariably lead to siderosis, and sooner or later sight will be lost by sclerosis of the retina and its arteries. Glass also seems to be capable of producing aseptic destruction of the injured eye. He has seen cases where the eye had apparently recovered and yet went on to ruin because of the presenec in it of glass. Such eyes had better be removed. Again, a foreign body may be aseptic, or if not, the eye may recover from infection, and still a secondary infection may occur very much later. A few years ago he saw an eye injured by a mining accident. After a few weeks, the eye seemed harmless, with a moderate degree of sight. The eye was not soft or tender or sensitive to light, although there undoubtedly were particles of rock in that eye. The eye behaved well, for a year and a half there was no reaction. Then violent infection set in secondarily. Either germs had been latent in the foreign body or they came through the blood stream to a *locus minoris resistentiæ*. The eye had to be removed.

The effect of sodium salicylate in preventing symphathetic ophthalmia does not seem to be proved. It probably may, he said, lessen the number of such cases by affecting the primary eye favorably, but two cases of which he has knowledge became sympathized under the use of sodium salicylate, so that as a preventive it can not be depended on. Similar conclusions were arrived at in Widmark's clinic, where 40 observations were made.

As to the effect of the salicylate on the sympathized eye, he can speak with more certainty. Of three cases he saw from beginning to end all recovered with perfect sight. They were typical cases of long duration, but recovery was permanent. In one of them the sympathetic trouble broke out 48 hours after the removal of an old injured eye. It had been injured forty years perviously. After a few weeks of fresh inflammation, the patient consented to enucleation, and after 48 hours the second eye became involved. The second case broke out about the third or fourth week after the injury, when the first eye was well toward recovery. It ran a slow and tedious course but the man recovered good sight in both eyes. It is doubtful, he thought, whether such a recovery would have been possible without sodium salicylate in large, very disagreeable doses persistently kept up until permanent recovery.

The question whether the disease of the second eye is sympathetic or not, as in the case quoted by Dr. Fiske, he said, is very often a difficult one to decide, especially in instances where the primary eye has been removed for some time. There is nothing absolutely characteristic in the appearance of the second eye from which one can draw the conclusjon that the disease is of sympathetic origin. For instance, a young man had had a small leucoma of the left eye, probably the result of gonorrheal infection at birth. It had never given him any trouble. When 18 or 19 years old, the other hitherto healthy eye passed through a severe attack of iridocyclitis. The disease was absolutely intractable. After two or three treatments the eye was ruined; retinal detachment was presumably present; postmortem proved it so. The eye was enucleated. Eleven years later the other eye became inflamed in exactly the same way; passed through a typical violent iridocyclitis, which destroyed it completely. The examination of the first eye was not made thoroughly to determine whether it had been tuberculosis. But had that eye still been present or removed recently, anyone would unhesitatingly have called the disease of the second eye sympathetic. Yet after the lapse of eleven years since enucleation sympathetic involvement of the remaining eye was out of the question.

Dr. Lewis saw a patient last December about 19 years old whose eye was injured by a portion of a copper cartridge entering the eye about three millimeters from the corneoscleral margin, and 36 hours later he could see a piece of the copper protruding forward through the root of the iris. There was a mild degree of iritis and at the side of the piece of copper there was a sharply circumscribed area of exudate on the anterior surface of the iris. The next morning he made a corneal incision and an iridectomy, removing the piece of copper. The patient

was in the hospital ten days, when all of the iritis had subsided. His media were clear and vision with a +0.37 cylinder at 75° was 30/33. Last month the vision was 30/33+ with correction. He gave a rather hard prognosis. Fuchs reported a similar case where ten years after the injury separation of the retina had occurred.

Dr. O. Tydings emphasized the value of the skiagraph as a means of diagnosis and the fallibility of the giant magnet. On one occasion he had a patient who came to him Feb. 16, 1902, for refraction. There was some deposit on the posterior capsule, and on inquiry the fact was elicited that in the August before he had had a slight accident in the factory, but had no trouble. Later, April 7, he returned with an attack of retinitis. He tried the giant magnet, but got no response. On Jan. 6, 1903, he had more trouble and was seen by Dr. Snydacker, who had a skiagraph made, which showed a foreign body. The lens was perfectly clear and remained so until the last examination when vision was very much reduced, but it was on account of the rhinitis and not on account of the lens. In an effort to remove the foreign body through the sclera the eye was lost. That case showed the value of the skiagraph. Dr. Tydings knows of a number of cases where the giant magnet failed to reveal steel in the eye when it was there.

He was surprised to hear of the removal of pieces of steel through the sclera on a route of preference. He has not seen the least bad result from foreign bodies brought out through the anterior chamber directly chargeable to that method. A patient came to him about ten days after the injury. The only symptom was failure of vision. Examination disclosed a piece of steel in the lens, proving that the history of the patient can not always be relied on.

Dr. Burdick again called attention to the fact that the *x*-ray does not make mistakes; that the giant magnet is not always reliable because many of the high-grade steels are not magnetic and for that reason do not pole with the magnet. The opinion of the skiagrapher is of great value because the making of skiagraphs and reading them is his business. Ophthalmologists ought to remember that and permit the skiagrapher to make the diagnosis in all cases.

Dr. Wm. H. Wilder stated that if in eyes that cause migratory ophthalmia there is not only a plastic but a proliferative inflammation, it might strengthen the idea that evisceration is just as good as enucleation. But he does not see that there is any great danger in removing the eyeball *in toto*, provided one keeps well within the capsule of Tenon, except in cases of specific infection, which can be determined beforehand by bacteriologic investigation. Of course, he said, it is a well-recognized fact that one should avoid enucleation in panophthalmitis in such a condition and evisceration is the suitable operation if the eyeball must be removed, but in other cases it seems that the wiser procedure is enucleation. He has observed that he does not get better motion or prosthesis from evisceration than from enucleation. So much reaction may follow evisceration, particularly if there is associated with it an attempt at introduction of an artificial vitreous, that the muscles will be so bound down that there will be practically no more motion of the artificial eye than after a good properly performed enucleation.

Another point too often neglected is choosing the time to operate on the eye which has undergone sympathetic or migratory ophthalmia. Younger practitioners are too prone to want to do an iridectomy or to remove the lens before they should. One should, he said, wait at least a couple of years after the eye becomes quiescent before opening the eyeball to do an iridectomy or removal of the lens, otherwise the result will be disappointing because of the plastic exudation which will fill the pupil.

Dr. Allport thought that another reason why the magnet does not remove the steel is that occasionally the projectile passes in with such force that it goes completely through the vitreous chamber and becomes firmly imbedded in the posterior portion of the eye, so that it can not be withdrawn by the magnet. As to the route of removing the foreign body, if it is in the front part of the eye, it ought to be taken out that way, but if it is in the vitreous chamber beyond the lens it should be withdrawn through the sclera, making the opening carefully with

a sharp knife, large enough to remove the foreign body. The lips of the scleral wound should be held open with a demagnetized tenaculum and the magnet being placed at the opening promptly withdraws the foreign body.

Dr. Fiske favors exenteration because v. Graefe, in a long series, found that enucleation favors the development of meningitis. As to the mobility of the eye, figures favor evisceration from 5 to 15 degrees. As to infection in his case, it certainly was present, and was diagnosed by Dr. Wood and himself.

SYMBLEPHARON.

Dr. Wilder exhibited a boy who had an extensive burn of the eye with lime resulting in a symblepharon of lower lid and also quite a destruction of the upper cul-de-sac. The new cul-de-sac was well lined with Thiersch grafts, illustrating his method of holding the grafts in place with plates covered with high-melting point paraffin, are a great advantage in cases where the cornea is in whole or part intact, as there is less danger of damage to that part than if metal plates alone are used.

CYCLODIALYSIS IN GLAUCOMA.

Dr. Wilder:—A man had glaucoma in the left eye 17 years ago and had an iridectomy done. Four or five weeks ago he came with glaucoma of the other eye; tension +2; vision lowered about 20/200. A cyclodialysis after the method of Heine and Mullen was done with cocain. The pupil is normal. Nothing else has been done for the patient. Vision is now 20/30, fields are markedly increased and tension has remained normal since the operation, now six weeks ago.

A CASE OF SYMPATHETIC OPHTHALMIA.

Dr. Oscar Dodd presented a case of sympathetic ophthalmia which dated back to May, 1906. The right eye was injured by a piece of glass, the cornea being cut towards the periphery, apparently not involving the ciliary body. The iris prolapsed; there was considerable irritation and practically no vision remained. He abscised the iris, after which there was slight prolapse of vitreous. Dr. Nance enucleated the eye June 23. Five days later the second eye became involved; vision decreased in spite of all treatment, but after a time began to improve. About the middle of August there was enough vision for the patient to get around and walk. The vitreous was clearing and there was practically no irritation. The patient was very anemic and in bad condition generally, so that it was difficult to carry out any treatment whatever. In October the eye was perfectly quiet and the vitreous was so clear that the fundus could be seen, although it was practically impossible to tell what her vision was. Dr. Dodd did not again see her until Jan. 31, 1908, when she returned again completely blind, with the eye much inflamed, pupil filled with exudate and prominent blood vessels all over the surface of the iris. Now the inflammation has quieted down, but she has only light perception. Projection is very good and tension is normal. Every effort is being made to get the patient into condition so that something may be done.

MORTIMER FRANK, Secretary.

FOX RIVER VALLEY MEDICAL ASSOCIATION.

On the invitation of the Aux Plaines Branch of the Chicago Medical Society the Fox River Valley Medical Association held another joint meeting with them at Wheaton, Ill., Wednesday, June 24, about thirty-five members and visitors being present. At the morning session Dr. Charles F. Read of Geneva read a paper on "Recent Surgery of the Nerves," and in the afternoon after an informal and very enjoyable dinner served by the ladies of one of the churches, Dr. W. S. Pickard of Maywood read a paper on "The Treatment of Pneumonia." The discussion of both papers was animated and as general as the time would permit.

RECENT SURGERY OF THE NERVES.

CHARLES F. READ, M.D., GENEVA, ILL.

The writer would beg to state at the beginning of this paper that he has been led by an interest in the work of other men rather than by any experience of his own, to present this subject for your consideration at this time. He trusts that the members of these societies, in the discussion to follow, may be able to supplement this fragmentary account with the results of their own experience along this line.

Let us in the first place briefly consider the process of degeneration and regeneration in the peripheral nerves. We are all more or less acquainted with the structure of the lower neuron, consisting as it does of a cell body with its direct continuation, the axis cylinder. Enclosing the latter and constricted at regular intervals by the nodes of Ranvier, is the medullary substance, semi-fluid and containing no nuclei. Still outside this insulating substance is the sheath of Schwann—or neurilemma cells—which is nucleated. Whenever the continuity of such a nerve is interrupted, destruction of the nerve structures just described follows in the peripheral segment—Wallerian degeneration. The neuro-fibrillæ of the axis cylinder change in appearance in the course of a very few days; the axis cylinder begins to stain differently than in health and to fade away in places, finally altogether disappearing. The myelin of the medullary layer is turned into something resembling fat, breaks up into droplets and is carried away by the phagocytes. The nuclei of the sheath of Schwann after some time multiply to a greater or lesser extent, and it is from these new neurilemma cells that a number of investigators claim a new axis cylinder is formed—a process of nerve regeneration called by them *autogenous*. Bethe, a German histologist and physiologist, is the principal advocate of this view, and even he of late has conceded that this new axis cylinder only becomes permanent and effective when it becomes linked with that of the central stump.

Halliburton, the eminent English physiologist, stated only a year ago in the *British Medical Journal*, May 11, 1907, that "peripheral structures are active in preparing the scaffolding but the axis cylinder, which is the essential portion of a nerve fiber, has an essentiallly central origin." So noted an observer as S. Ramon Cahal holds this view also. The neurilemma cells supply nourishment, but says Halliburton again, "We have never seen anything of the nature of an axis cylinder or neurofibrillæ in the peripheral segment of a divided nerve, provided connection with the central end is successfully prevented." And following this he makes the very sensible statement that "it is most improbable that the mesoblastic cells, which make up the neurilemma, could give rise to such a highly organized structure as the axis cylinder, which so far as we know, is exclusively epiblastic in origin." The article is strengthened with some very clear micro-photographs of the axis cylinders of the central portion of a severed nerve growing out with bulbous ends into the distal portion. Every one does not agree with the last author quoted, however, as I have already intimated. In fact I find in the literature that the most of surgeons and neurologists are non-committal, all agreeing however, to this one essential fact, that work in nerve suture must be done with a view to allowing the best opportunity for the growing ends of the central axis cylinders to easily penetrate the distal segment.

Although the immediate suture of divided nerves has been part of routine wound treatment for years, the joining together of nerves of different distribution as an operation of choice for the relief of local paralyses, is a matter of the last ten years, and more especially the last five. In fact, as regards the literature of the surgery of the entire nervous system, I have been considerably impressed with the fact that while the *Index Medicus* classifies the surgery of the other systems of the body very carefully, when you wish to find anything relating to the nervous system you must pick it up wherever you can. The search of the literature is thus made tedious and uncertain.

In 1894 Charles Smith operated on two horses for laryngeal paralysis, anastomosing the spinal accessory with the recurrent laryngeal, with considerable benefit to his patients. In 1902 Cushing operated for facial palsy of traumatic origin, using the spinal accessory with some success. In 1903 a case of perineal palsy was successfully treated by Spiller and Young of Philadelphia. At about the same time Hackenbruch of Germany began to work along similar lines. Up to 1906, however, only scattering cases are to be found in the literature, and the operation has only acquired an assured position as it were in the last two or three years. The operation for facial palsy was probably performed for the first time by Ballance of London, in 1895, but when Dr. Murphy read a paper upon this and kindred operations before the State Medical Society a year ago last May, the discussion that followed very clearly brought out the fact that the surgeons and neurologists had not grappled with the question for very long, and as yet were not considering it very seriously.

Arnold Davidson in *Beiträge für Klinischen Chirurgie*, March, 1908, details some six cases from the Heidelberg clinic and goes into a very thorough consideration of the operation. One of the cases he describes was that of a girl of 21 years old, in whom a facial paralysis had followed middle ear disease at 9 months—a duration of over twenty years. On Sept. 1, 1904, the spinal accessory was exposed in an incision some ten centimeters long, running parallel to the anterior border of the sternomastoid muscle, from the root of the ear downwards. The parotid was then shoved forward and the facial nerve exposed for some three centimeters. The posterior belly of the digastric was then cut across, the accessory cut half way through and the free end of the flap thus raised with its base central to its free end was inserted into a split in the facial, after which the digastric was united and the wound closed. The operation was entirely unsuccessful, as one would expect it to be after twenty years' duration of the palsy with the consequent changes in the muscle substance itself. No note was made as to whether or not they tried the electric reaction of the facial muscles previous to operation, as is now the custom in doubtful cases—some men even going so far as to advocate anesthetizing the patient and stimulating the involved muscles subcutaneously through the incised skin.

Another case was operated five months after the commencement of paralysis following operative section. The technic was the same. Two years and ten months later the symmetry of the face was very much improved, but the right forehead was still smoother than the left, the right naso-labial fold shallower than the left and the palpebral angle less. The right eye could be nearly closed but the patient succeeded but once in tightly shutting it. In laughing the left side of the mouth was elevated higher than the other and the whole mouth was pulled somewhat to the left. The patient could whistle quite well and the function of the muscles innervated by the spinal accessory was well preserved, but there was a slight drooping of the right shoulder and a hollowing of right supraclavicular space. When the right arm was raised there was often a simultaneous movement of the facial muscles upon the same side, but active face movements were not accompanied by those of the shoulder or sternomastoid. These two cases are fair examples of the results obtained from these operations. Failure is common, and a perfect result is a rarity, but a cosmetic result is often obtained and certainly is not to be despised by patient or surgeon. If the patient can even approximately close his eye, he is protected from a very great and constant danger, while an improvement in the appearance of the face in repose is certainly a boon worth the seeking.

In almost all of these cases accompanying movements take place in the face after the operation, when the head is turned or the shoulder is raised, that is, when the centers controlling the innervation of the spinal accessory are excited. One patient told Cushing that when he wanted to laugh "straight" he could help it out by moving his shoulder—that is, by not inhibiting a portion of the impulse from the accessory center. Another man could not carry an umbrella in his hand without grimacing at the same time, and still another had to

hold the hand of the affected side tightly with the other in order to lessen the shoulder movements. When the patient is young and intelligent there is good chance for him to learn to dissociate these movements, probably either by dividing his spinal accessory center into a face and a muscle center or by acquiring a control of this center with the higher one of the face. This is a matter of years' practice, however, and scarcely possible for the older patient or one lacking in intelligence and application.

And right here lies one of the great arguments for the use of the hypoglossal nerve in preference to the accessory in this operation—in that the accompanying movements are not observable; indeed, one of these patients had not noticed, until questioned, that such a condition existed at all. Again, the slight hemiatrophy of the tongue is not perceptible, while that of the shoulder and neck is at times quite marked, and especially undesirable in women who wish to wear low necked garments. The paralysis in either operation is quite negligible, save when the healthy nerve is completely severed; and when this is done for the sake of a surer facial result, as Cushing recommends, the consequent paralysis is of less importance when the hypoglossal has been used. And again the face center is nearer the hypoglossal center than to that of the accessory, which fact is thought to have considerable to do with the speedy improvement often noted in those operations utilizing the former nerve. The operation itself is said not to be much more difficult than the other.

In 1902 an unsuccessful operation for the relief of peroneal palsy following infantile paralysis was performed by Peckham, and in 1903 James K. Young of Philadelphia, performed the first successful one, under the advice of Spiller. In this a third of the posterior tibial nerve was inserted into the peroneal. In the course of four months there was a slight improvement of the paralysis. One and a half years later the patient was able to elevate himself upon the toes of the affected foot and to stand upon it unsupported. The leg, too, lengthened and the foot enlarged. Re-education is here, as in the case of facial paralysis, a very considerable factor, for the nerve supplying flexor muscles is the one most often used to conduct the new impulses—those of extension, that is, dorsal flexion—after the operation.

In a necessarily hurried review of the literature I was able to find very little concerning this operation. Judging from this and from the statement of Dr. Allan Starr at this last June convention, to the effect that he had thus far secured better results for his patients with tendon transplantation than with nerve suture, it would seem that the work along this line had not been a success thus far—at least not great enough to lead to reporting it, for unfortunately most men are still more prone to report their successes than they are their failures, even though as much may often be learned from the one as from the other. There are doubtless, however, many conservative surgeons waiting to-day for the results of operations done a year or two, or even three ago, to develop enough to bear reporting. The operation, if attempted, is better done from six months to a year after the attack, and in old cases best not at all—here tendon work is indicated on account of the muscle degeneration attendant upon long disuse and changes in the trophic cells of the anterior horns. When the case is well chosen the procedure is certainly a most scientific one and will doubtless grow in favor as we learn how best to carry it out as well as when not to do it.

Two years ago Spiller and Frazier of Philadelphia invoked the aid of nerve suture in the effort to relieve the sufferings of a case of athetosis in which the involuntary movements of the upper extremities were so rapid and so constant as to preclude the securing of a clear instantaneous photograph. Spiller thought that an anastomosis of flexor nerves with those of extensor distribution might bring about the muscle balance so sadly needed. This Dr. Frazier accomplished by a somewhat elaborate system of uniting the musculo-spiral with the median and ulnar nerves. Immediate paralysis naturally followed the operation, but after an interval of some months the patient began to flex his fingers slightly, a thing he had been unable to do voluntarily previous to the anastomosis. The

athetoid movements did not return, save slightly in the shoulder, and after more time he could flex the wrist, and then the forearm upon the arm. Eight months were consumed in making this progress, but the young man's life was made bearable by the operation and a subsequent one upon the other arm. I mention this case, not to point to the operation as a fixed procedure for a certain symptom complex—but rather to suggest the vast possibilities of this general mode of practice under consideration.

And in this latter connection I would like to refer to an article by Basil Kilvington in the *British Medical Journal*, April 27, 1907, in which the author discusses the possibility of successfully innervating pelvic structures by means of nerves arising higher up in the cord with a view to correcting certain symptoms in cases of crush of the lumbo-dorsal cord. We all know that one of the first thoughts of a man when he gets a case of this sort is, "How long can I keep the urinary system from becoming hopelessly infected?" With this in mind Kilvington has performed several experiments upon dogs, from one of which I quote the following: "Dog No. 2 was operated upon Aug. 20, 1906, and the anterior root of the seventh lumbar nerve joined to both roots of the second and third sacral nerves of the left side. On Feb, 12, 1907, 176 days later, the cord was cut across at the sixth lumbar and faradism of the seventh then produced: (a) vigorous contractions of muscles of the pelvic floor; (b) vigorous contraction of the sphincter ani, and after cessation of stimulation, extrusion of feces; (c) expulsion of urine in a jet. Excitation of the seventh lumbar upon the other side produced no such effect, but excitation of the second and third sacral produced the same effect."

In man the author states that the twelfth, the eleventh and even the tenth dorsal nerve can be sutured directly to the second and third sacral nerves. Possibly a nerve graft would enable one to use roots even higher up. At present the dangers of sepsis and shock, together with the untried state of the operation would naturally cause the surgeon to hesitate, but inasmuch as it would, if successful, prevent bladder complications, together with their disagreeable and ultimately fatal sequelæ, it would not be at all strange if it were yet to become a procedure to be seriously considered by both patient and surgeon in these cases. Five years from now it may possibly be at least as common as suture of the heart muscle.

As to the technic of nerve suture, there are a few considerations, as generalized by Keen and Frazier, that I would bring to your attention before closing.

(a) In the first place, the nerves involved are to be localized with precision according to their anatomical landmarks and the incision made a little to one side of the structures to avoid the possibility of their injury. In the case of an extensive cicatrix, electric stimulation with sterile electrodes is of very great help. Previous work upon the cadaver with a view to the case in hand, is of course invaluable.

(b) The approximation of the nerve ends can be accomplished in various ways according to the exigencies of the conditions found. These methods are much the same as are used in tendon work; that is, if direct suture is impossible, by transplantation—by suture at a distance with catgut—by resection of bone, but this very rarely—and by the utilization of a neighboring nerve trunk in the anastomosis, making of it a go-between as it were. It is in this step that we appreciate the necessity of a proper conception of the process of nerve regeneration; that it is essentially a growth of the axis cylinders out from the central stump—even though we grant that there may be some provisional axis cylinder formation in the peripheral segment. Our suture of nerve to nerve must be made with the end in view of affording these growing filaments the very greatest possible opportunity for penetration into the distal segment. We are to make everything as easy as possible for the flow of growth represented by the elongating axis cylinders. To this end the straight end to end suture is probably the best, and if splitting of one nerve is done, the surfaces of this slit should be scraped or even a small wedge cut out, if the nerve is large enough for this.

(c) Nerve substance should be cut with a sharp knife, not with scissors, which are bound to crush the delicate fibers more or less, no matter how sharp they may be.

(d) Sutures should be introduced before severance of the nerve, if possible, to avoid the use of forceps. The sutures may be passed through the substance of the nerve itself, when they should be of fine cat-gut, or through the sheath only, when they may be either of silk or cat-gut.

(e) Adhesions are to be prevented by the use of Cargile membrane or by imbedding the union in muscle or fat.

(f) Tension is very naturally to be avoided as in any other work of this nature, and to this end the nerve may be stretched—often a beneficial operation in itself, especially where there has been inflammation—and the parts then placed in a position affording the greatest relaxation to the point of suture, where if possible, they should be retained with a plaster dressing.

(g) The after treatment consists in keeping the parts at rest for from two to four weeks; after which time gentle massage with galvanic, followed later by faradic electricity, should be employed for a long period of time.

It is this after care, with the attendant anxious waiting for results, that must seriously tax the surgeon's faith and patience in these cases. Surgeons like to get results quickly—in fact, no small part of the charm and fascination of the art lies in the promptness with which results are obtained—if obtained at all. It is in this line of work, however, that the surgeon must learn his lesson of patience. He must watch and wait three to six months, a year—possibly only learning the full result of his efforts, when the patient is traced some three or four years later and found to have at last fulfilled expectations.

DISCUSSION.

Dr. H. H. Roberts, of Maywood, congratulated Dr. Read on his paper, but said he had expected it to be a little more general in its nature. In regard to the regeneration of nerves he wished to emphasize the fact that nerves without neurilemma do not admit of anastomosis as they do regenerate, which has been demonstrated by J. B. Murphy and others; that in division of the spinal cord, unions did not take place because the neurons composing the cord itself were devoid of a neurilemma. Peripheral nerves all regenerate.

The various kinds of pressure paralysis due to exostosis, tubercular caries, calluses, hemorrhage, etc., can be relieved by removing the pressure and nerve grafting, if necessary. Paralysis of the facial nerve offers a particularly tempting field for interference on account of its cosmetic value. Like most of those present he had had little experience in this great field, his being limited to one case. The part was immobilized for four weeks, followed by passive motion and the galvanic current; sensation was restored in about ten weeks and motion later. He would especially mention the necessity of protecting the point of suture by covering with fat or muscle tissue, and in the facial, of avoiding scar contraction and of maintaining parallelism between the diseased and living nerves grafted. The implantation of nerve tissue seems unsatisfactory and it is preferable to unite the severed ends. He had heard of several cases where nerves previously severed had been freshened and united with good results. He had been attracted by the treatment of varicose ulcer by nerve stretching, which seems to change the distrophic nature of the ulcer. The ulcer is curetted and the popliteal nerves exposed and stretched over the fingers, using considerable force, with ligation of the long and short saphenous veins, and the ulcer heals very soon. Anterior poliomyelitis cases have received great benefit from nerve anastomosis most frequently of the two popliteals. The muscles have developed and the children have been able to run and play.

The subject of injecting nerves for the relief of pain is just now occupying the attention of the profession, and great results have been reported. The fluids injected are chloroform, alcohol, osmic acid and sterilized water. The speaker has obtained forty-eight hours' complete relief from supra-orbital neuralgia by

the injection of sterilized water, but the pain gradually returned till it was as bad as before. Alcohol is the most popular remedy now, and is injected in strengths from 70 per cent. to 90 per cent., and as many as thirty injections of the same nerve have been made before a cure was effected. Schlosser of Munich, reported 100 per cent. cures, many cases having had repeated injections before cures were effected. Dr. Hugh T. Patrick has been successful in trifacial neuralgia, all his cases being benefited without any untoward results; the technic is rather elaborate and difficult for an amateur without experience and not knowing the landmarks.

Dr. G. L. Bailey, Oak Park, Ill.:—While a few of us have had much experience in the field of nerve grafting or anastomosis, it is nevertheless a subject of very great interest to the whole profession. As yet it is in its infancy and its field of application is limited by our lack of experience and ignorance of many of the problems of nerve physiology and especially of nerve development.

The principal argument against nerve grafting is that we must sacrifice a sound nerve to bolster up a weak or destroyed one, to which we can never hope to transfer all of the energy from the sound nerve. It requires endless patience and a lapse of from one to two years or even more to secure a result from this operation which is perceptible. Even where nerve anastomosis has been successfully done the amount of nerve energy transferred by the operation may not be sufficient to accomplish any practical functional good.

The greatest field for nerve grafting would seem to be in anterior poliomyelitis and in this disease it offers theoretically the ideal therapeutic measure, but unfortunately only a small number of cases of anterior poliomyelitis are suitable for this operation, namely: those in which only one nerve trunk is affected. To my mind, tendon transplantation offers much more certain results and a wider operative range without the danger of increasing the disability by sacrificing still more nerve function than has already been done away with. Tendons may be elongated by the use of silk after the method of Lange of Munich, by whose method it is now possible to affix almost any tendon directly to the periosteum at any desired point.

Of all of the nerve operations, nerve bridging is the oldest and the limit of the gap that can be overcome has been fixed at about three centimeters. The various materials which have been used to protect the nerve end from being blocked in its growth across the wounded tissues have been only moderately successful and by no means absolutely certain. For this purpose I would suggest the prepared artery of some animal as offering many advantages over cat-gut, metal, or any of the other substances which are now employed for this purpose.

Probably the most favorable field for nerve grafting is in the face and the nerves of the upper extremities, as these nerves are very accessible and particularly in the face; it is necessary to transfer only a small amount of nervous energy to operate the small muscles of the face. A case of facial paralysis of fourteen years' standing was reported much benefited by anastomosing the hypoglossal nerve on the paralyzed facial, at the last meeting of the American Orthopedic Society in Chicago.

The subject of nerve surgery is in its infancy and has been much neglected, largely on account of erroneous physiological conceptions of nerve regenerations. We have yet to learn the laws of nerve compensation by which one set of nerve cells takes up the work of another set which has been destroyed and while we know that this substitution does occur in certain cases, we are powerless to aid in its accomplishment or to know when to expect it. Clinical experience has demonstrated many of the older teachings of physiology to be erroneous, especially has it demonstrated that nerves will branch, and that one nerve trunk may supply antagonistic muscles with energy.

The essayist mentioned nerve stretching as a treatment of varicose ulcer and I can not help saying that this seems an extremely roundabout way of treating a condition when subcutaneous removal of the long saphenous vein is so much simpler and more direct.

Dr. G. C. Shockey, Melrose Park:—I have been much interested in listening to Dr. Read's paper on "Surgery of the Peripheral Nerves," and think the topic in its discussion should be confined to the peripheral nerves. As such the surgery embraces such conditions as poliomyelitis, birth and traumatic paralysis of the extremities or of the facial nerve.

Considering at the same time surgery of the spinal cord gives rise to confusion due to the difference of the physiology and pathology and their power of regeneration.

In general, the term Wallerian degeneration is loosely applied as referring to both the upper and lower motor neuron. The main anatomical difference is the neurilemma of the neurons making up the peripheral nerves, and to this is largely due the reparative process of nerves, and one of which the white fibers of the cord are not capable of following destructive lesions.

The experimental work with regard to anastomoses of the spinal nerves is interesting, but does not seem practicable after lesions causing destruction of an intervening portion of the cord. I can not see how such a bridging could take place to enable transmission or normal function over a segment of white fibers in which death had occurred from any cause and which are not capable of regeneration.

I agree with Dr. Bailey that peripheral nerve surgery is more applicable in cases of poliomyelitis in which a limited group of muscles is involved; or that better results are had in selected cases. When the lesion is more extensive likely better results are obtained by tendon grafting.

In facial paralysis the general principles of nerve anastomoses are the same and results should be equally good. My impression is that they are better when the hypoglossal is used instead of the spinal accessory nerve.

Since Dr. Roberts refers to the injection of nerves in cases of trifacial neuralgia, I would differ as to deep injection being elaborate in technic, assuming that you know the anatomical point where you want to make the injection, which must be at the point of exit of the nerve from the cranium. With this in mind it may be done in the office without a general or local anesthetic. This method is applicable to the severe types of neuralgia, such as usually seek radical surgical operations.

Dr. H. T. Patrick has reported a number of cases so treated, and his results have been gratifying.

It is to be understood some will have to be injected two or more times at long intervals. On the two cases I have seen the deep injection done, the technic in itself is quite simple. I should not expect to get more than temporary and transient relief from injections made at the periphery.

In a word, the best understanding of surgery of the peripheral nerves will come from keeping clearly in mind the anatomical and pathological conditions as they occur in the peripheral nerves and the cord, and that the reparative power of the nerves does not apply to the spinal cord.

Dr. Read (closing the discussion):—In closing I would say that Dr. Roberts and Dr. Bailey are doubtless right in giving the preference at present to tendon transplantation over nerve anastomosis in the great mass of palsies following infantile paralysis. The latter operation is as yet in its infancy and the results so doubtful as to cause the surgeon to hesitate before he interferes with the function of a healthy nerve in an already damaged extremity for the sake of conferring a doubtful benefit. However, our mastery of this work is not yet complete and it is only by continued effort along this line that we can ultimately make sure as to its efficacy.

As to the question concerning the term of Wallerian degeneration as applied to the peripheral nerves and the possibility of autogeneous regeneration where there is a neurilemma. I can only fall back upon the authority of Halliburton as quoted before and upon the statement of Cassirer in his article upon

neuritis in the *Deutsche Klinik*. The former tells us that he has never seen an axis cylinder formed in a distal stump when due precautions were taken to prevent union with the central one. Cassirer speaks of Wallerian degeneration taking place in severed peripheral nerves, and also states that it can with the utmost difficulty only, be differentiated from the degeneration succeeding inflammation.

As to the possibility of the anastomosis of the spinal nerves, the experiments of Kilvington were only cited as an example of what we may yet be able to accomplish in work along this line. Such efforts are stimulating to endeavor upon the part of other men at least, even if they never amount to anything in themselves.

LAWRENCE COUNTY.

The Lawrence County Medical Society held its third quarterly meeting in the City Council Hall, Lawrenceville, Ill., Sept. 7, 1908, at 1 p. m., Dr. H. V. Lewis presiding. The following physicians of the county were present: Drs. Brian, McMurray, Friend, Turner, Mountz, McDowell, Petty, Trout, Hayhurst, Emmons, Sprinkell, Duncan, Schrader, Lewis, Bryant, Purdy, French, Trueblood, Lewis and Gore. Dr. T. J. McGowen, of Vincennes, visitor.

The subject, "The Care of Women Through Pregnancy," was taken up by Dr. McMurray, of St. Francisville. The doctor's discussion fired the meeting with enthusiasm, so much so that the discussion was entered into by Drs. McDowell, French, Bryant, Mountz, McGowen, Friend, Petty and Trueblood. Dr. C. J. Sprinkell, of Russellville, considered the subject, "Summer Diarrheas of Children." The subject was very ably handled by the doctor and was discussed by Drs. Hayhurst, Duncan, Lewis, McDowell, Trout and McMurray.

A very important event of the day was an entertainment given the physicians' wives of the county at the home of Mrs. J. D. Bryant. The physicians and their wives were entertained at a banquet in the evening, given by the physicians of Lawrenceville. This meeting was an enthusiastic one from beginning to end, and all members claim the time well spent.

H. V. Lewis, President.

MADISON COUNTY.

The Madison County Medical Society met in quarterly session in the Commercial Building in Alton, Ill., Sept. 4, 1908, at 2 p. m., Dr. Waldo Fisher, president, in the chair. Members present: Drs. Wadsworth, Burroughs, Foulds, Barnsback, Ferguson, Fisher, J. H. Fiegenbaum, Johnson, H. R. Lemen, Dugan, Ihne, Yerkes, Haskell, Bowman, Joesting, Robinson, Beard, Cook and E. W. Fiegenbaum. Visitors: Drs. Horine of Brighton, Ill.; Early, Parl Howe, Emma Howe, of Granite City; and Winn, of Alton. On motion the courtesy of the society was extended to all visiting physicians. The applications of Dr. A. F. Kaeser of Highland, together with proper credentials from the McLean County, (Ill.) Medical Society, was presented, and by unanimous vote he was elected a member of this society by transfer. The death of Dr. L. F. Schuessler being announced, the chair appointed as a committee on resolutions, Drs. H. R. Lemen, J. H. Fiegenbaum and L. Bowman.

The topic of the day, "The Physician as a Business Man," was very ably presented by Dr. T. L. Foulds, of Alton, in a very interesting paper, and the different phases of the business life of a physician were fully brought out in a general discussion, participated in by nearly every one present, led by Drs. J. L. R. Wadsworth of Collinsville and H. C. Early of Granite City. A vote of thanks was tendered to the Retail Merchants' Association for the use of room, to the Alton Medical Society for refreshments, and to Mr. Geo. Marsh for a box of cigars. On motion adjourned to meet in annual session at Alton on the first

Friday in December. This was one of the most profitable sessions of the year, and was the source of great interest to all that attended. The society is growing in numbers with every meeting, having more than two-thirds of all the physicians in the county enrolled as members.

E. W. FIEGENBAUM, Secretary.

UNION COUNTY.

Meeting of July 29, 1908.

The Union County Medical Society met in Chemical Laboratory of Union Academy at 2 p. m., July 29. Meeting called to order by President D. W. Grear. Twelve out of the seventeen members were present and six visiting doctors. Dr. T. Le Agnew read a paper on "Acute Dysentery, Especially among Children," which brought out quite a discussion on the treatment. Drs. O. J. Schwer and S. C. Martin reported a case of brain trouble which was quite puzzling, which was discussed. Dr. Grear reported a case of puerperal eclampsia which was discussed by Drs. Agnew and Schwer. After some discussion a committee of five from different sections of the county was appointed to draft a fee bill to be be discussed at the next regular meeting. The Union County physicians are waking up to the fact that it pays to belong to the County Society.

E. V. HALE, Secretary.

WABASH COUNTY.

The regular meeting of the Wabash County Medical Society was held at Dr. Schneck's Hall, Mt. Carmel, July 28, at 3 p. m., with Dr. R. J. McMurray, president, in the chair. Members present: Dr. R. J. McMurray, St. Francisville; Drs. Maxwell, Utter, Mercer and Schneck of Mt. Carmel; also Judge E. B. Green and Dr. T. H. Daly, D.D.S., of Mt. Carmel. Program: Paper, "Is it Physiologically Impossible to Sweat Blood?" Judge E. B. Green; paper, "Some Points of Interest to Both Physicians and Dentists," Dr. T. H. Daly, D.D.S. Both papers were very much appreciated by all present and a vote of thanks extended to both. Dr. S. W. Schneck gave a short report of the meeting of the American Medical Association. It was moved that a committee be appointed to arrange for the October meeting at some other point in the county outside of Mt. Carmel and the motion was carried. The president appointed the following committee: Drs. Schneck, Maxwell, Utter and Mercer.

W. ELMER MERCER, M.D., Secretary.

NEWS OF THE STATE.

PERSONAL.

Dr. George E. Fosberg and family, Chicago, have returned from Europe.

Dr. and Mrs. William N. Senn, of Chicago, have returned from Europe.

Dr. Alonzo B. Middleton and family, Pontiac, sailed for Europe August 29.

Dr. and Mrs. Philip S. Doane, Chicago, expect to sail from Europe October 17.

Dr. and Mrs. Edward L. Moorhead and son, Chicago, have returned from Europe.

Dr. and Mrs. John B. Murphy, Chicago, sailed for home from Europe September 12.

Dr. Henry R. Harrower has closed his laboratory in Kankakee and moved to Chicago.

Dr. J. Earl Meloy and wife have returned to Lincoln after several months' visit in Europe.

Dr. P. J. H. Farrell, Chicago, has been elected commander-in-chief of the Army of the Philippines.

Dr. and Mrs. Charles J. Drueck, Chicago, are spending a month about Quebec and the Saguenay River.

Dr. Charles E. Crawford, Rockford, has been re-elected grand medical advisor to the Sons of St. George.

Dr. Alexander H. Ferguson, Chicago, sailed September 9 to attend the meeting of the International Surgical Congress in Brussels.

Dr. Frederick W. Mercer, Chicago, was recently very seriously injured by a fall from the third floor to the parlor floor of his house.

Dr. S. S. Fuller has been appointed Health Officer of the city of Paxton, in accordance with a new ordinance adopted by the council July 6, 1908.

Dr. A. M. Earel and wife, Hoopeston, Ill., leave October 2 for Europe, sailing from Quebec. The doctor will do post-graduate work in Vienna and London.

Dr. Jacob Frank, Chicago, has donated 400 volumes on medical and surgical subjects to the Columbus Hospital, Chicago, to provide a reference library for internes.

Dr. George Mitchell, first assistant physician at the Illinois General Insane Hospital, South Bartonville, has started for a year of rest and study in Africa and Europe.

Dr. Antonio Lagorio, Chicago, who has been taking treatment at his own Pasteur Institute on account of infection from a wound from the bone of a rabbit which had been inoculated with rabies, is reported to be out of danger.

NEWS ITEMS.

The students of Dr. Byron Robinson are erecting a bronze bust to him. The affair is in the hands of Dr. Benjamin H. Orndoff, 2277 Wilcox Avenue, Chicago.

Drs. Emanuel J. and William N. Senn, Chicago, have presented to the John Crerar Library more than two thousand volumes from the library of the late Dr. Nicholas Senn, to be added to the Senn collection.

Dr. O. J. Price, Chicago, was exonerated from all blame in connection with the death of a young child August 19. It was found that the prescription for creosote given by Dr. Price was filled by a druggist's clerk with 90 per cent. carbolic acid.

The contract for the building for the new hospital for tuberculosis on the grounds of the Cook County Hospital, Chicago, has been awarded for $220,900 to the lowest bidder. The new building will be five stories in height, 162 feet long, with three wings, each 128 feet long, and will accommodate 320 patients.

Beginning September 8 each Chicago school medical director will make a daily visit to each school assigned him. At the first visit the inspector will make a rapid inspection of all pupils to determine if any seeking admission bear evidence of contagious disease. More detailed inspections will be made later.

The Lake County Antituberculosis Association has been organized at Waukegan, with Dr. John G. Foley president and Dr. W. H. Waterson manager. The association expects to erect a building capable of accommodating twenty patients, on the edge of Waukegan and near the lake, to cost about $10,000. In addition to its tuberculosis colony, the association intends to conduct an educational campaign among the people of the county.

At the Physicians' Annual Golf Tournament, Chicago, Dr. Franklin H. Martin won the championship, which carries with it the possession of the Dickerman cup for a year and a gold medal. Dr. William H. Wilder was the runner-up and received a silver medal. The Billings trophy was secured by Dr. F. H. Daniels. Dr. H. H. Mather captured the Lynch cup, and Dr. G. W. Mosher secured the low gross score and the gold medal to commemorate it. At the annual meeting held after the tournament, Dr. G. W. Webster was elected president, Dr. R. Crowder secretary for the coming year, and Drs. Dodson, Plumber and Stevenson are directors.

A POINT IN THE USE OF THE TALLQUIST SCALE FOR HEMOGLOBIN ESTIMATIONS.—Walter H. Buhlig presents some comparisons of the readings of different sized drops of blood on the Tallquist scale with the results from the same patient on the Dare instrument. Taking a drop of blood of the size of the perforation in the color scale, the readings were practically always low, taking the Dare as a standard. When a spot of twice that size was read, the results obtained agreed very closely with those from the Dare.—*Quarterly Bulletin of the Northwestern University Medical School*, September, 1908.

MEDICAL SOCIETY NOTES.

The Tri-State Medical Society of Iowa, Illinois and Missouri held its annual meeting September 8 and 9 at Ottumwa, Iowa. An admission fee of $3 was charged which entitles the members to a certificate of membership and attendance.

The Mississippi Valley Medical Association will hold its annual meeting October 13, 14 and 15, at Louisville, Ky. The president of this organization is Dr. Arthur R. Elliott, of Chicago, and Dr. Henry E. Tuley, of Louisville, is secretary.

The Clay County Society met in regular quarterly session Tuesday, September 1, at Clay City, Ill., at 1:30 p. m. Dr. G. C. Pridmore read a paper on eclampsia which was very instructive. The meeting adjourned to meet at Flora, Ill., the second Tuesday in December, next.

At the August meeting of the Galesburg Medical Society resolutions were adopted that the newspapers of the city be requested to refrain from mentioning names of physicians in connection with their professional work; and furthermore, that a copy of the resolutions, together with a petition to be signed by the physicians, be presented to the newspapers for publication.

PUBLIC HEALTH.

The first public bath in the Twenty-fourth ward, Chicago, and named in honor of the Dr. Fernand Henrotin, was formally dedicated September 1. The bath house has twenty-shower baths and is located at Ashland and Fullerton Avenues.

In Chicago there were 348 more deaths in August than in July, and 132 fewer deaths in August than in the corresponding month last year. The deaths from all causes were 2,690, of which acute intestinal diseases caused 815; consumption, 288; heart disease, 198; violence (including suicide), 194; nephritis, 157; cancer, 124, and pneumonia, 120.

The Department of Health of Chicago has sent out notices to physicians worded as follows: "The Department of Health suggests: Why not use tuberculin and diagnose your case of consumption now? Why wait until there is no hope? Which policy is best for your patient—for the community—for you? The department will give you the tuberculin."

The State Board of Health in the May and June issues of its *Bulletin* have published a report of the extensive examination of the municipal water supply of Illinois, conducted under the auspices of the State Board of Health and the State Water Survey. The report also contains several analytical tables of the various water supplies in different counties. In the June issues of the *Bulletin* is to be found the index to the two issues; also part of the *Bulletin* is devoted to the discussion of the sewerage system and the water supply of Chicago.

The Chicago Department of Health in its weekly *Bulletin* gives a full summary of the deaths resulting from diarrheal diseases during August. The diarrheal diseases claimed 818 deaths during the month of August, 30 per cent. of the total from all causes and 546 more than all forms of

tuberculosis, which was second in order of highest mortality. Of these 818 deaths 718 or 87.8 per cent. were among children under 2 years of age. Twelve were 7 days to 6 months old, 239 were from 6 months to 1 year, 138 from 1 to 2 years and only 100 were among persons over 2 years of age. Deaths from the diarrheal diseases among children of foreign parentage exceeded the deaths of children of native parents by 327 or more than 172 per cent. The location of all diarrheal disease deaths among children under 2 years of age occurring during August is shown to be in the west side river wards, in the district southwest of the Union Stock Yards and in the South Chicago rolling mills district near the mouth of the Calumet River. They are thickest where the Slavs live. Children of Slav parents suffer much more generally from diarrheal affections than do children of other nationalities. The deaths in proportion to the population are also very much higher in the thickly settled areas than in the other parts of the city. During the seven weeks that the department has maintained a force of 75 medical inspectors in these areas of highest mortality for the purpose of instructing mothers in the proper care of their babies during the hot weather, visits have been made at the homes of 43,784 families. Of the 204,341 persons comprising these families 11,099 were children under 1 year of age, 26,741 were between 1 and 5 years and of the remainder, 94,535 were children of 5 years of age. The inspectors found 2,410 cases of sickness, mostly diarrheal affections, and on inquiry as to the vaccinal status of members of these families found 24,702 unvaccinated persons. It is of interest to note that 76.2 per cent. of the babies in the congested areas of the city—the foreign quarters—are being fed mother's milk. This is in decided contrast with infant feeding conditions in the better residence portions of the city where the proportion breast fed is much lower. It has been the observation of the medical men that the chief trouble lies in the feeding of improper foods and overfeeding. Our experience of the summer in this work emphasizes the necessity of educating mothers in the care of their young. It is a most important service and with persistent and vigorous prosecution we believe that it will, in due time, be the means of cutting the infant death rate in two.

NEW INCORPORATION.

The secretary of the state in Springfield has licensed the following corporation: Dr. Liroch Company, Chicago; capital, $2,500; general medicine business and dispensary; incorporators, Willis H. Hutson, Richard H. Mather and A. M. Olson.

MARRIAGES.

HARRY KAHN, M.D., to Miss Grace Strasser, both of Chicago, September 2.

CHARLES F. ISAACS, M.D., to Miss Iva Hasset, both of Chicago, August 29.

ALFRED C. WIEBUSCH, M.D., Cora, Ill., to Miss Anna Fiene, of Steeleville, Ill., August 20.

FREDERICK W. BARRY, M.D., to Miss Bertha Alene Allen, both of Coffeen, Ill., August 24.

BERT M. BREWSTER, M.D., Fieldon, Ill., to Miss Leila M. Chambers, of Godfrey, Ill., Aug. 17, 1908.

DEATHS.

HENRY ALPERS (examination, Illinois), of Aviston, Ill.; died recently and was buried from the home of his son in Lincoln, Ill.; August 7.

SAMUEL G. BRYNING, M.D., medical department, Victoria College, Toronto, 1863; for nearly a third of a century a practitioner at Fulton, Ill.; died in a sanitarium in Chicago, January 8, aged 81.

ELBERT FERGUSON NEBEKER, M.D., College of Physicians and Surgeons, Chicago, 1906; a member of the Illinois State Medical Society; died suddenly at his home in Danville, August 27, aged 27.

ALEXANDER G. ORR, M.D., Jefferson Medical College, Philadelphia, 1869; a member of the Illinois State Medical Society; died at his home in Benton, August 25, from cerebral hemorrhage, after an illness of a few hours, aged 68.

AVA MICHENER, M.D., University of Iowa, College of Medicine, Iowa City, 1888; of Homer, Ill.; a member of the Illinois State Medical Society; died in El Paso, Texas, August 20, from asthma, after an illness of about two years, aged 75.

MARY H. BOWEN, M.D., Northwestern Universty Woman's Medical School, Chicago, 1876; for thirty years a practitioner of Chicago; died at the home of her son, August 29, from paralysis of the throat, after an illness of six months, aged 74.

EDGAR L. PHILLIPS, M.D., medical department of Washington University, St. Louis, Mo., 1856; surgeon of an Illinois volunteer regiment during the Civil War; for many years a practitioner of Galesburg, Ill.; died at his home in Goshen, N. Y., September 1, after a prolonged illness, aged 61.

BOOK NOTICES.

THE READY-REFERENCE HANDBOOK OF DISEASES OF THE SKIN. By George Thomas Jackson, M.D., Chief of Clinic and Instructor in Dermatology, College of Physicians and Surgeons, New York. Sixth edition. 12mo., 737 pages, with 99 engravings and 4 plates, in colors and monochrome. Cloth $3.00, net. Lea & Febiger, Publishers, Philadelphia and New York, 1908.

The sixth edition of Dr. Jackson's handbook testifies to the popularity of the work. The author has recently been elected to the full chair of Dermatology in the College of Physicians and Surgeons, New York, and is therefore in a position to know the requirements of the medical practitioner. A table disposes of the subject of classification and nomenclature in the briefest and clearest way by arranging the various diseases in the most rational position with a permanent primary lesion motion. The book is also rich in formulas of proved value in this trying class of cases. The publishers have succeeded in producing a handsome work at a very moderate price.

THE PRINCIPLES AND PRACTICE OF GYNECOLOGY. E. C. Dudley, A.M., M.D., Professor of Gynecology, Northwestern University Medical School; Gynecologist to St. Luke's and Wesley Hospitals, Chicago, etc. Fifth edition, revised and enlarged, with 431 illustrations and 20 full page plates in colors and monochrome.

Dr. Dudley in his profession explains his manner of treating the subject under consideration and his reason for considering the divers diseases so far as practicable according to their pathological and etiological sequence. The great popularity of this work in the past disposes to the success of this plan. He has also made a thorough going revision of the text, which includes the recent advances in gynecology, and in so doing has condensed, rewritten and rearranged many parts, and in this way has found space for considerable new matter without materially enlarging the volume. Special changes and practical additions have been made in those chapters treating of salpingitis, ovaritis, pelvic peritonitis, myoma uteri, carcinoma uteri, descent of the uterus and retroversion and retroflexion and a chapter on incontinence of urine in women has been added. A surgical instrument catalogue element has been eliminated, all instruments, so far as practicable, being shown as they appear in actual work. Undoubtedly the new edition of Dr. Dudley's work will maintain the popularity heretofore accorded the previous editions.

ANATOMY, DESCRIPTIVE AND SURGICAL. By Henry Gray, F.R.S., late Lecturer on Anatomy at St. George's Hospital, London. New American edition, enlarged and thoroughly revised, by J. Chalmers Da Costa, M.D., Professor of Surgery and Clinical Surgery, and Edward Anthony Spitzka, M.D., Professor of Anatomy, in the Jefferson Medical College of Philadelphia. Imperial octavo, 1625 pages, with 1149 large and elaborate engravings. Price, with illustrations in colors, cloth, $6.00, net; leather, $7.00, net. Lea & Febiger, Publishers, Philadelphia and New York, 1908.

The seventeenth edition of Gray's Anatomy retains the high standard which has been expected of this publication for the past fifty years. Gray's Anatomy bears the same relation to the medical world that Webster's Dictionary does to the literary world. This edition proves that the popularity of the work is destined to remain as great in the future as it has in the past. It has been thoroughly revised, every page bearing alteration and improvement, and the whole section on the nervous system has been rewritten in conformity with recent revolutionary changes in methods of approaching and viewing it. Professor Spitzka, who has done this section, has made the subject a special field of study and to the qualifications of an anatomist of the first rank he adds the skill of an artist as well, so that his own hand conveys his knowledge directly to the eye of his reader. Professor Da Costa is both an anatomist and a surgeon, and the editorial combination therefore unites what is required for the revision of a work on this subject. The use of colors is still further developed in this new edition. We bespeak for the new Gray the cordial reception to which its merits entitle it.

PAIN: ITS CAUSATION AND DIAGNOSTIC SIGNIFICANCE IN INTERNAL DISEASES. By Dr. Rudolph Schmidt, Assistant in the Clinic of Hofrat von Neusser, Vienna. Translated and edited by Karl M. Vogel, M.D., Instructor in Pathology, College P. and S., Columbia University; Clinical Pathologist and Assistant Attending Physician, St. Luke's Hospital, and Hans Zinsser, A.M., M.D., Instructor in Bacteriology, College P. and S., Columbia University; Assistant Pathologist, St. Luke's Hospital. J. B. Lippincott Company, Publishers, Philadelphia and London.

One of the most popular works read by the physicians of the last century was the one entitled, "Rest and Pain." A new work along this line has just been issued by the J. B. Lippincott Company of Philadelphia and London, writ-

ten by Dr. Rudolph Schmidt, of Vienna, and translated and edited by Drs. Vogel and Zinsser of Columbia University, New York. The subject of Pain is discussed in ten chapters, all of them full of interest to the physician. It is considered in a most systematic manner and a scheme evolved which will simplify and hasten correct conclusions. This work should prove a very valuable addition to the working library of the busy physician.

ERRATUM

In our last issue of THE JOURNAL in the supplement, under subheading "Apparently Cured," it reads, "All constitutional symptoms and expectorations with bacilli *present* for a period of three months," should read "all constitutional symptoms and expectorations with bacilli *absent* for a period of three months."

FOR SALE

The best location for a physician on north side, Chicago. Three flat and office. $20,000 will take back $14,000 mortgage. Practice $12.000 yearly. Reason for selling, ill health. Address **W. F. Petersen, 94 Wabash Ave.**